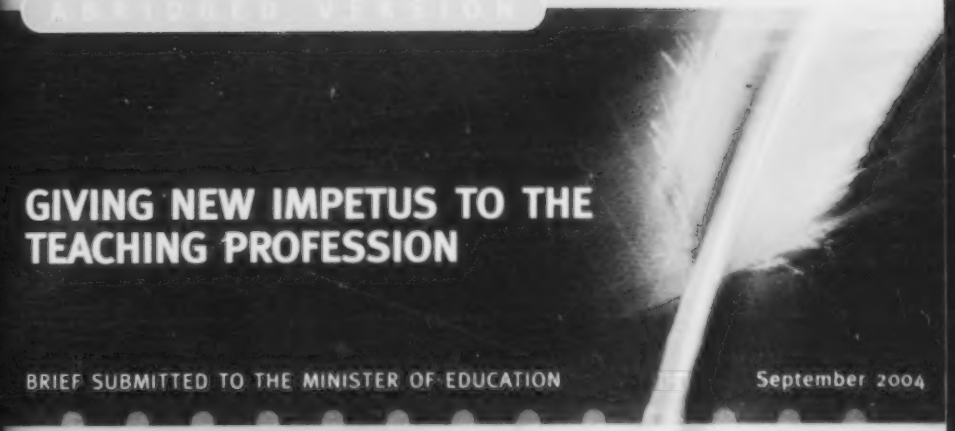
CONSEIL SUPÉRIEUR DE L'ÉDUCATION

ABRIDGED VERSION

GIVING NEW IMPETUS TO THE TEACHING PROFESSION

BRIEF SUBMITTED TO THE MINISTER OF EDUCATION

September 2004



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PREAMBLE

This publication by the Conseil supérieur de l'education results from a request made by the Minister of Education who, in November 2002, formally asked the Conseil to submit a brief on the teaching profession at the elementary and secondary levels, focused more specifically on

> "... the direction and importance to be given to the teaching profession by Québec society, based on an overall vision of the profession that allows for renewal, professionalization and, especially, valuing of the profession"
> (excerpt from the letter of the Minister of Education; free translation).

The Conseil gave joint responsibility for preparing this brief on the teaching profession to the Commission de l'enseignement primaire and the Commission de l'enseignement secondaire, considering that the expertise and experience of members from both the elementary and secondary levels was needed for a thorough examination of the issues.

As part of the preparatory process for this brief, the Conseil deemed it relevant to hold two major consultations: one with social players and the other with educational stakeholders. The first consultation targeted organizations involved in education, asking them to make written submissions and, in some cases, attend hearings. The Conseil is fully aware that this approach generated extra work for many organizations, but considers that their input has helped it to clarify its thinking. As a result, it would like to thank them for generously agreeing to participate in its work.

The second consultation targeted teachers at the elementary and secondary levels, through discussion groups. The Conseil would like to express its thanks for the interest they have taken in its work, and for their willingness to share their experience and expertise, allowing the Conseil to look more closely at the issues by linking them to the concrete realities of today's schools. Finally, the Conseil also benefited from the input of various experts it called upon to take part in its work, and it thanks them for their valuable contribution.

INTRODUCTION

For the last 40 years, the Conseil supérieur de l'éducation has remained closely involved with the teaching profession. It has stated, on numerous occasions, how important it is to maintain a high-quality teaching staff and establish conditions that allow teachers to use all their professional skills.

In order to respond effectively to the request made by the Minister of Education, the Conseil has focused on the significance of teaching, both in terms of the way the profession is perceived and in terms of its future development, since it considers these two aspects to be closely related.

The goal set by the Conseil was to answer the following two questions:

I. How is the teaching profession being perceived in Québec in 2004?

II. What direction should the future development of the profession take?

I. HOW IS THE TEACHING PROFESSION BEING PERCEIVED IN QUÉBEC IN 2004?

TEACHING: A CONSTANTLY EVOLVING PROFESSION

The teaching profession is in a state of continuous change. Formerly considered to be a vocation, since the 1960s, teaching has moved towards recognition as a true profession. The professionalization of teaching is an underlying trend in education, extending well beyond the borders of Québec to other jurisdictions, and is often seen as a response to the new expectations placed on schools. Professionalization is often considered one of the prerequisites for the implementation of a series of education reforms, in Québec and elsewhere. Overall, the main objectives of the professionalization movement are to increase the professional autonomy of teachers, both in their teaching and in the management of their profession, to encourage the ongoing development of teaching expertise, to promote professional ethics, and to improve the social status of teachers.

Professionalization has not proceeded in a linear fashion since the 1960s. The first foundations for a true teaching profession were laid in the 1960s and 1970s. The publication of the Parent report and the transfer of teaching training programs to Québec's universities, for example, were key points in

this process. Labour conflicts, in particular up to the mid 1970s, led to considerable improvements in teachers' working conditions. The 1970s, however, were also a time of upheaval. The publication of a green paper in 1977, followed by an orange paper in 1979 and a white paper in 1982, led to major changes in the school system. In the late 1970s and early 1980s, conflict between unions and employers had lasting effects on teachers, for example when special legislation was adopted, notably in 1982.

A period of budget restrictions that began in 1976 and a more centralized approach to management led to a definition of teaching that did not encourage professional autonomy. In addition, teaching seemed to be limited to classroom instruction and the application of reforms and changes designed by other groups. A surplus of newly qualified teachers made entry into the profession difficult; new teachers had to face difficult working conditions and low job security.

In 1984, at the request of the Minister of Education, the Conseil published a brief on the teaching profession that painted a relatively gloomy picture. The 1980s were a difficult time for teachers, both because of their working conditions and because of a lack of progress in the area of professionalization.

However, the 1990s were more encouraging. In 1992 the Conseil published an annual report that crystallized thinking on the teaching profession, and made proposals for its future development. A major reform of teacher training, launched in 1994, embodied the objectives of professionalization in the new approach to basic training. The subsequent reform of the education system that began in 1997 created a new lever for professionalization, introducing new areas in which teachers could exercise their professional autonomy. The reform provided support for professionalization, in particular, by redistributing the powers of the various players in the education system, and by recognizing their respective areas of expertise. It increased the freedom with which teachers could interpret and apply the official curriculum, and encouraged them to exercise their professional judgment. In its 2002 brief, the Office des professions du Québec provided more formal recognition that teaching was indeed a profession, even though it did not go as far as recommending the creation of a professional order to allow the profession to manage its affairs autonomously.

The significance attached to teaching today is thus clearly influenced by a "professional ideal" that has gradually emerged since the early 1960s.

A PROPITIOUS TIME FOR THE DEVELOPMENT OF THE TEACHING PROFESSION

The Conseil considers that the current context is a propitious time for the development of the teaching profession, because the progress made so far has led to the consolidation of several aspects that can now form the basis for further development.

Introduction of a reference framework for teaching competencies

The reference framework for teaching competencies, originally intended for use in designing teacher training programs, is the fundamental point of reference for the development of the teaching profession. The knowledge and skills used in teaching can only be rationalized by clarifying the significance attached to the profession and the "professional ideal." The professional ideal, in fact, forms the basis for the measures that structure the profession, such as the reference framework, the organization of and curriculum for basic teacher training, the certification of new teachers, and professional development. Currently, the reference framework is based on a "professionalizing" view of teaching that focuses on its professional nature and on the importance of the cultural dimension.

The introduction of the reference framework for teaching competencies is one of the key changes made over the last 10 years to the way the profession is organized. For example, teacher training programs are now designed using a shared reference framework; basic teacher training has been extended by one year and focuses more on the integration of theoretical and practical training and the development of teaching competency; partnerships between schools and universities have been developed, especially in the area of teaching practicums; and teachers can also use the reference framework to direct their own professional development.

Regulation of the supply of new teachers to reflect the needs of the labour market

In 1994, Québec's universities and the Ministère de l'Éducation du Québec (MEQ) agreed to limit the number of admissions to teacher training programs, in order to regulate the supply of new teachers on the basis of labour market needs. This measure led to an improvement in the conditions of employment of newly-qualified teachers, especially in terms of job security. It also helped avert a flood of trainee teachers in elementary and secondary schools, given that each trainee teacher was required to complete 700 hours of practical training over four years, and it ensured the best possible conditions for completing this training.

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The professional empowerment of teachers

Since the implementation of Bill 180[1] in 1998, powers have been shared in a new way, especially between schools and school boards. In keeping with the emphasis on decentralization, schools have been granted more powers, and as a result, teachers have significantly broader powers in professional terms. The professional involvement of teachers is governed by two official documents. First, the *Education Act* states that teacher participation is required at the school and school board level with regard to certain aspects, and that teachers must be consulted when certain decisions are made. Second, the Québec-wide agreement negotiated between the government and the unions stipulates that some decisions with professional implications must be submitted to the teaching staff, using the voting mechanisms defined in the local collective agreements.[2]

The professional involvement of teachers has also been promoted at the provincial level by the creation of four bodies whose membership includes teachers:

1. the Comité d'agrément des programmes de formation à l'enseignement (CAPFE)
2. the Comité d'orientation de la formation et de la profession enseignante (COFPE)
3. the Commission des programmes d'études
4. the Comité d'évaluation des ressources didactiques

These four bodies play a mainly advisory role (except the CAPFE, which has responsibility for reviewing and accrediting elementary and secondary teacher training programs), and they give teachers a better opportunity to influence the guidelines and decisions made by the MEQ.

Since the implementation of Bill 180, teachers no longer act only in their classrooms. They have a greater number of responsibilities at the school and school board level, and are more frequently consulted on MEQ guidelines and decisions.

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1. Bill 180 became the *Act to amend the Education Act and other legislative provisions* (1997, c. 96).
2. Chapter 44.00: "Methods, subjects and procedures of participation of teachers other than the subjects (and their methods) negotiated and agreed upon at the provincial level."

Rapid development of research into teaching practices that places more emphasis on real-life teaching

The rapid development of education research, and especially of research into teaching practices, provides more support for the professionalization of teaching, by rationalizing the knowledge and skills applied in teaching, and by promoting the development of teaching expertise. The extremely broad scope of what is known as research into "teacher effectiveness" includes studies of various kinds to determine the variables that influence the effectiveness of teachers. One major branch of this research pays particular attention to the role of teaching practices in teacher effectiveness, and the research findings demonstrate their importance in ensuring student success.

According to this research, not all teachers have the same influence on the learning acquired by their students. In a similar context, and all other things being equal, some teachers help their students learn more. It is only since the 1970s that the importance of studying teaching practices in order to improve student learning has been fully recognized. Previously, the socio-economic background of students, for example, or the influence of the curriculum on student success, were the main focus of study, while the potential of teaching methods to improve student learning received little attention.

Research into teaching practices over the last 40 years has fostered recognition and development of a knowledge base for teaching. This knowledge base is made up of a set of teaching practices that have been documented and recognized as effective through research, and it also constitutes a set of strategies that can be used by teachers to reflect on and analyze their own practices.

The knowledge base for teaching has considerable importance for professionalization, since one of the criteria for a profession is that it be based on a corpus of rational knowledge. Without this corpus of knowledge, the effectiveness of a given teacher can only be justified on the basis of that teacher's knowledge and experience, and in this area few people can lay claim to any degree of authority. However, it is important to not fall into the trap of the "model teacher," or to believe that "ideal practices" should be applied by all teachers. The complexity of teaching situations must be taken into account, along with the fact that teachers do not apply methods, but rather take ownership of them and integrate them into their own teaching. From this point of view, all teaching situations are different, and all teaching practices are unique. In addition, it is by no means clear that a teaching practice that is effective in one situation will be as effective in all subjects,

or for all age groups, regardless of their specific characteristics. A knowledge base for teaching should be considered, instead, as a guide for action. In this way, the influence of sound practices can be maximized, even though the professional autonomy of teachers, the range of possible contexts and student groups, and the unique nature of each pedagogical interaction must be taken into account to reduce the risk of failure. In other words, the whole field of professional development for teachers depends on the development of research into teaching practices.

RESTORING THE VALUE OF THE TEACHING PROFESSION

Restoring the value of the teaching profession is a key concern for several stakeholders in the education field, and it is also an important dimension in professionalization. Further to its consultations, the Conseil notes that the question of recognition for the teaching profession is still a contentious issue.

Although results of surveys must be viewed with caution, those conducted as part of the consultations held by the Conseil show that, overall, people trust teachers. In general, teaching is one of the professions most widely trusted by the general public and parents. There is also general recognition for teachers' competency, and the important influence their competency has on student success. Other views expressed reveal that teaching is still an attractive profession. Overall, the consultations show the relatively high value placed on the teaching profession by the general public.

However, the situation reflected in the surveys runs counter to the prevailing discourse, according to which the value of the teaching profession needs to be restored and does not enjoy the social recognition to which it is entitled. Apparently, teachers lack prestige, authority and credibility–or at least this is the feeling teachers express. They also feel they have to be on the defensive against the government, and are the victims of bias. Based on its analysis of the situation, the Conseil notes that teachers are highly sensitive to the image of their profession which, in their view, is negative; they consider that the expectations of the general public and of parents are simplistic and disproportionate. In other words, it appears that teachers find the public too critical of their work, failing to recognize the complexity of their task.

How can the gap between the apparently positive image of teachers in Québec society and the lack of recognition perceived by teachers be explained? Many different hypothetical explanations have been advanced by various bodies. The Conseil has not been able to assess, with any accuracy, the value of each hypothesis, but it has noted their existence and

their possible consequences on the status of the teaching profession. It considers that priority should be given to the aspects most likely to increase the intrinsic value placed on the teaching profession, in other words, from within the profession itself. For this reason, the Conseil has chosen to present guidelines and development priorities that focus on the empowerment of teachers, by stressing actions that can restore the power to act that they need in order to fulfill their duties. The Conseil considers that the development of the teaching profession must be based on a new emphasis on autonomy and responsibility.

THE PURSUIT OF A PROFESSIONAL IDEAL

As previously stated by the Conseil, professionalization involves moving collectively towards a professional ideal. By focusing on an ideal, the members of a profession can build a collective professional identity, and also their own individual professional identities. As the collective and individual identities are constructed, the parameters of the professional ideal evolve to accommodate them. In other words, the professional ideal has no separate existence. Instead, it is a social construct in a constantly evolving state, which is why it is so difficult to isolate its various parameters with any accuracy. However, a failure to name the parameters makes it impossible to reflect constructively on the nature of the profession. To progress towards a professional ideal, it is necessary to name its main components.

Despite the inherent difficulties, the Conseil has decided to outline the main points of the professional ideal for teachers, to better define what should, in its opinion, constitute the goal of development. This set of parameters represents the essential or fundamental elements of the teaching profession, and can be used to reflect on the nature of the profession and its future development.

In the view of the Conseil, to state that teaching is a profession means that:

- the act of teaching, the core act in a teacher's duties,
  - is a complex and interactive act that includes a fundamental cultural dimension
- teaching involves other actions that must be defined, such as
  - supervising trainee teachers
  - supporting newly appointed teachers
  - providing instruction for fellow teachers
  - preparing teaching materials
  - coordinating shared projects
  - taking part in education research, etc.

- all the actions that make up a teacher's duties
  - must be based on knowledge and skills
    - derived from practical teaching experience and from theories developed as part of education research
    - comprising disciplinary, didactic and pedagogical aspects
  - must be governed by professional standards, in other words, a set of competencies for which a threshold level of mastery is a condition for teaching, and which
    - are embodied in basic teacher training and ongoing professional development for teachers
    - are updated on an ongoing basis to take into account new developments in the profession and in society, and the findings of education research
  - must be taken into account by teachers when reflecting on their teaching practices and developing their competencies throughout their careers
  - must require teachers to exercise their professional judgment and critical faculties
  - must require an ability to work individually, and as part of a team
  - must be accomplished with autonomy and responsibility
- teaching has a fundamental ethical dimension, since it is both a public service and a profession that involve human interaction; teachers must exercise moral judgment
  - first, when interpreting their duties; the educational role of teachers must be based on the values, mission and ultimate objectives of the Québec school system
  - second, on a daily basis, when interacting with students and other partners in the education system
- teachers must establish a professional relationship with the other education players, based on recognition of their respective expertise and on a genuine level of partnership, depending on their respective duties
- teachers must be able to contribute to the development of the school system, both within their own schools, and at the school board and MEQ level
- teachers must be able to take part in the major social debates that concern education and help define the duties of teachers with regard to their students
- teachers must be able to help define and manage all the supervisory measures for the teaching profession, because they are in the best position to assess their relevance in terms of the duties they perform and the conditions under which the teaching profession is exercised

These parameters should, in the view of the Conseil, form the basis for the ongoing development of the teaching profession.

II. DEVELOPING THE TEACHING PROFESSION IN TERMS OF PROFESSIONALIZATION AND THE RESTORING OF ITS VALUE: IDENTIFYING KEY GUIDELINES

To help teaching progress towards a professional ideal for which the parameters are now better defined, to ensure that the value of teachers is recognized by Québec society, and to encourage teachers to develop a feeling of competency and pride in their work, the Conseil proposes three guidelines to form the basis for eight priority development areas. The first guideline concerns the quality of the next generation of teachers, the second concerns the need to support teachers as they develop their professional competencies on an ongoing basis, as well as to recognize their expertise, and the third concerns the importance of embedding professionalization in the exercise of the profession and in its management.

Guideline 1:
Ensure the quality of the next generation of teachers by setting high professional standards for the teaching profession

PRIORITY DEVELOPMENT AREA NO. 1: DEVELOP RECOGNITION OF PRIOR LEARNING TO OPEN UP NEW TEACHER TRAINING PATHS

The Conseil heard calls from several organizations for a return to a two-stage teacher training model,[3] made up of subject-specific training followed by a shorter period of pedagogical training, similar to Québec's former teacher training procedure. These calls were based on two main concerns: an impending shortage of teachers in certain subjects; and a perceived lack of subject-specific competencies among secondary-school teachers graduating under the new teacher training procedure.

The observations made and arguments presented cannot, in the view of the Conseil, support such broad generalizations. However, the Conseil recognizes that a lack of flexibility in the teacher training procedure may discourage some candidates from applying despite their obvious potential.

The Conseil wishes to stress, primarily, that the current teacher training procedure results from a desire to strengthen the integration of theoretical

3. Under the two-stage teacher training model, students generally studied their teaching subject first, and then took a shorter course in pedagogy. The pedagogy course lasted one year in the former Québec teacher training programs.

and practical knowledge, and introduce closer ties between subject-specific, pedagogical and didactic knowledge. The new programs were designed using a competency-based approach. Despite some of the criticisms voiced by the organizations consulted, the Conseil considers that the concurrent training model,[4] as used in the current teacher training procedure, is the most conducive to the development of the profession, even though further improvements can still be made.

Preserving the current concurrent training model

The Conseil considers that the arguments relating to a shortage of teachers in some sectors do not justify a return to the former system of short pedagogy programs. The recruitment difficulties observed seem to be local or regional, and are connected to the problem of mobility, which would not be solved by the creation of short pedagogy programs. In addition, studies are being conducted in the United States to assess the effectiveness of various types of teacher training, including short programs, especially with regard to the problem of attrition. In brief, it appears that teachers who begin teaching after completing a short program are more likely to leave the profession than those who complete a full-length program. The final conclusions of the studies are not yet available, but the preliminary findings indicate that caution is necessary.

Another reason the Conseil does not wish to see a return to short pedagogy programs is that it believes that the current training model, based on concurrent studies and a competency-based approach, must be preserved. The Conseil believes that teachers must acquire specific teaching expertise that, in concrete terms, depends on the mastery of professional competencies that are acquired in complex, integrated training situations.

Diversify teacher training paths while preserving high professional standards

The Conseil is more receptive to the arguments presented by various organizations concerning the single access route to the teaching profession. It heard a range of testimony showing that many promising candidates are excluded from the profession because they are discouraged by the lack of flexibility in the four-year model.

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4. Under the concurrent teacher training model, students study their teaching subject and receive pedagogical training at the same time.

The most common situation is that of a graduate from a bachelor's degree program in a specific subject who, despite the existence of a process to recognize university-level credits,[5] must still undertake a four-year program in order to obtain a teaching licence. The main obstacle to accelerating the process lies in the actual structure of the programs, which include prerequisite courses and practicums at specified points in time. Even though the university recognizes candidates' prior learning, particularly in their specialized subject, they must still go through the entire four-year program. In this case, the total duration of the program is the factor that appears to discourage some candidates.

Other situations call for a more flexible approach to teacher training paths to provide new access points, for example, if an accountant wants to teach mathematics or if a childcare worker wants to become an elementary school teacher. These situations are, in fact, more complex because non-academic prior learning, rather than just course credits, must be recognized. The candidates possess, in terms of the reference framework for teaching competencies, experiential learning[6] for which it is harder to obtain recognition from a university. The need to complete a four-year course in order to obtain a teaching licence may also discourage these candidates, who will be forced to learn many things they already know.

The Conseil has learned that the universities, at the request of the Table de concertation MEQ-universités, have agreed to set up a bridging provision for graduates from certain single-subject degree programs who wish to teach at the secondary level. This provision will create an accelerated path[7] for the Bachelor of Education degree in secondary education in certain subjects. The Conseil supports this approach, but wishes to take the process one step further. It believes that the principles of recognition for prior learning can be applied in the field of basic teacher training to allow the creation of differentiated paths.

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5. Universities in Québec have tools to respond to applications for recognition for credits earned in other universities or other programs, but the procedure and requirements may vary from one university to the next.
6. Experiential learning: learning gained through employment or everyday living.
7. An accelerated path would still be based on a concurrent model, but would give quicker access to the teaching licence than the current four-year program.

The Conseil has already asked the Minister to recognize the following three principles:

- **First principle:** all persons are entitled to social recognition of their learning; however, it is incumbent upon them to prove that they have acquired such learning.
- **Second principle:** persons are not required to repeat learning they have already acquired; in the recognition of learning, the important thing is what the person has learned and not where, when or how it has been learned.
- **Third principle:** all prior learning recognition systems must be transparent (CSE, 2000a, p. 16).

In keeping with these principles, any differentiated paths established for teacher training programs will necessarily require the creation of a procedure for recognizing prior academic and experiential learning. In fact, the professional standards for teaching should be used as a reference framework for deciding whether or not to recognize the prior learning and experience of prospective teacher training candidates. The principles outlined above also point to greater flexibility in the teacher training structure, to allow candidates whose existing competencies have been recognized to take only the training they need and pass more quickly through the teacher training procedure.

Considering:

- the various ways in which teaching is perceived in Québec, particularly within the education system, and the tensions created in organizational terms
- the growing consensus that teaching is primarily a profession
- the importance of using the current reference framework for teaching competencies not just for teacher training, but for the profession as a whole
- the fact that the concurrent training model, and the competency-based approach, must be retained
- the need to offer a wider range of paths for teacher training
- the relevance of the principles for the recognition of prior learning defined by the Conseil in its brief on the subject published in 2000

the Conseil recommends

that the Minister of Education

1. **underline the fact that teaching is a profession that can only be exercised once specific teaching expertise has been acquired, that, in concrete terms, depends on the mastery of professional competencies**
2. **establish "professional standards"[8] for the teaching profession to specify the threshold levels of competency needed to enter the profession and to teach**
3. **see to the preparation and implementation of a mechanism for recognizing prior academic and experiential learning[9]**
   a. **that certifies the acquisition of competencies, having regard to the relevant professional standards, regardless of how they were acquired by the student**
   b. **that allows students to complete only the missing training they need to join the teaching profession**

PRIORITY DEVELOPMENT AREA NO. 2: INCREASE THE PACE AT WHICH CHANGES TO THE PROCEDURE AND CONTENT OF BASIC TEACHER TRAINING ARE INTRODUCED

Basic teacher training has undergone a far-reaching transformation over the last 10 years. The training procedure itself has been substantially modified, and the various players involved in basic teacher training have also begun to move towards more strongly affirmed partnerships.

The Conseil recognizes that the universities have made a major effort to introduce the changes to basic teacher training and that have not yet come into full fruition. Studies have shown that, overall, employers are satisfied with the work of the first cohort of graduates from the four-year bachelor's degree program, at both the elementary and secondary levels. The consultations undertaken by the Conseil, however, show that the teacher training reform has not yet been fully implemented. It therefore considers that implementation must continue, but that more attention must be paid to the points with which the school communities are still dissatisfied.

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8. In other words, a set of competencies for which a threshold level of mastery would be considered as necessary for teaching.

9. "... when used in connection with the recognition of prior learning, 'experiential learning' generally refers to learning acquired through employment or daily living experiences, and to learning that was not planned or sought, since the experiences themselves had other objectives." (Landry, 1997, quoted in CSE, 2000a, p. 117).

Dissatisfaction with regard to the teacher training procedure

The main points on which the Conseil noted dissatisfaction concerned the universities, which have general responsibility for teacher training. For example,

- teacher training providers have not yet completely integrated the reform of the education system into their courses
- the program-based approach and competency-based instruction have not been fully assimilated, as reflected in a lack of coordination between the departments responsible for program design, and the absence of a consistent pedagogical approach to competency-based programs
- difficulties have been experienced in the way practical training is supervised by the schools and education faculties concerned

These points reveal a gap between the spirit of the new, competency-based teacher training programs, and the training currently provided by the universities. The Conseil considers that the criticism also reflects two ambiguities connected with basic teacher training.

The first ambiguity involves the role played by the universities, which seems to oscillate between two poles. Some universities consider that basic teacher training should reflect the spirit of the education reform, and prepare teachers to practise their profession within the framework defined by the reform. Other universities, though, consider that the goal is to train teachers who will be able to teach while assimilating the inevitable changes introduced in the education system. The view of the Conseil is that basic teacher training must not only prepare teachers to practise their profession in the current educational and social context, but also to adapt to any future changes. For this reason, it considers that a balance must necessarily be found between the two poles. This question does not just concern teacher training, but all professional training programs. For example, should aerospace engineers be trained to use only the current technologies, or should they be prepared to deal with the ongoing technological changes in their sector and to apply new developments? The answer to this question is clear, and should apply without modification to teacher training.

The second ambiguity is related to the first, and involves the dual role of instructor and researcher played by teacher training providers, and on the actual exit profile targeted by basic teacher training.

First, the Conseil recognizes that university researchers need to enjoy academic freedom, and that it is a basic condition for conducting research

activities. From this point of view, the education reform, in terms of both its underlying rationale and the pedagogical methods it generates, can and must be subjected to university research and scrutiny. However, the Conseil also believes that teacher training providers must recognize the new conditions for exercising the profession and the supervisory measures to which their students will be subject by law. The reform currently implemented at the elementary and secondary levels is not optional: it is prescribed by law, and imposes duties on education players. For this reason, the Conseil considers that the training providers must find a better balance between necessary criticism of supervisory mechanisms and the conditions for practising the teaching profession (in their role as researchers) and an ethical commitment towards the teachers of the future, who must be provided with the tools they need to practise their profession in an environment that is determined and whose characteristics are known (in their role as teacher training providers).

Second, the Conseil believes that teacher training providers must clarify the exit profile that determines the professional competencies students are expected to have mastered when they complete their basic training. In their dual role as instructors and researchers, teacher training providers are responsible for training future education researchers as well as future teachers. Since the nature and characteristics of these two professions (teacher and education researcher) are so different, the competencies students are expected to master at the end of their training are clearly distinct.

The Conseil considers that the universities should clarify their position concerning the function of teacher training, the ethical requirements of the dual role of instructor and researcher played by teacher training providers, and the definition of exit profiles. Finally, the Conseil considers that realistic expectations concerning basic teacher training should be clarified. Teacher training is the foundation on which new teachers will build their careers. This means that schools cannot expect new teachers to have the same depth of competency as experienced teachers, and that the ongoing development of professional competencies must be made possible as part of a teaching career. All this calls for a period of reflection on the respective contributions made by universities and schools to the basic training and ongoing professional development of teachers.

Criticism concerning the content of teacher training

Other concerns have been raised about the content of teacher training. It has been stated, for example, that

- basic training should prepare future teachers more effectively to deal with a wide range of social backgrounds and family situations
- the training given to new teachers in academic subjects under the new procedure is insufficient
- the new programs do not provide enough training in subject-specific didactics
- the competencies acquired by new teachers in the language of instruction are insufficient

The Conseil has not carried out any studies of the composition of the new teacher training programs and it therefore cannot corroborate these statements. However, the testimony given by several organizations leads it to consider that they are of importance. First, with regard to the range of social backgrounds and family situations that teachers will encounter, the Conseil suggests that the universities should review their programs in light of the two following observations:

- Québec society contains a wide range of social backgrounds and family situations. This is a reality that must be faced, and teachers must be given the tools they need to deal with it.
- Since education is a public service, teacher training must equip future teachers to meet the needs of all students in Québec, whatever their individual characteristics.

Next, concerning the subject-specific and didactic training provided, the Conseil recognizes a long-standing debate. The underlying question concerns the amount of subject-specific knowledge needed to teach a given subject. Does a chemist need more advanced training in chemistry than a chemistry teacher? How much training in chemistry is considered necessary for a chemistry teacher? To lay to rest the recurrent concerns about the extent of the subject-specific and didactic knowledge needed to teach, the Conseil suggests that subject-specific and didactic competency thresholds should be established for the elementary and secondary levels, in all subjects, and that trainee teachers should be required to meet the thresholds by the time they graduate. The debate will then shift to the nature of the subject-specific and didactic competencies required and the threshold levels for teaching, given that mastery of a given subject can be pursued over a lifetime.

The charge that new teachers lack proficiency in the language of instruction constitutes a problem that needs to be examined in detail. This is a favourite topic in daily newspapers, and one that undermines the efforts to restore the value of the teaching profession. Currently, the Conseil is not in a position to judge the existence or extent of the alleged lack of proficiency in the language of instruction, but it recognizes that this is an important question and one that receives more attention than teachers' competency in mathematics, science, pedagogy or any other area. The need for a teacher to master the language of instruction, whether French or English, is self-evident. In recent years, several measures have been implemented to raise the quality of the language used by future teachers. For example, a basic competency has been inserted into the reference framework for teaching competencies, tests in the language of instruction have been introduced, along with catch-up courses for future teachers, and pre-hiring exams have been established by school boards. However, despite all these measures, concerns remain about a lack of proficiency in the language of instruction. The Conseil considers that the current situation should be examined in detail. It also considers that for competency in the language of instruction, as for all the other competencies needed to teach, clear and compulsory threshold levels should be established for trainee teachers on graduation.

Considering:

- that teacher training constitutes an ethical commitment towards future teachers, who will have to deal with the actual conditions in which teaching takes place
- that it is difficult to strike a balance, in basic teacher training, between training based on the actual exercise of the profession and that based on criticism of the conditions in which it is exercised
- the need to ensure that Québec has a highly qualified body of teachers able to provide effective instruction, while taking into account the range of student types and social and family situations encountered by teachers
- the fact that the subject-specific training received by new teachers must be closely monitored, in the same way as didactic and pedagogical training
- the need to examine all the measures introduced over the last ten years to raise the competency level of future teachers in the language of instruction, and to assess the actual effect of the measures

the Conseil recommends

that the Minister of Education

4. with regard to professional standards for the teaching profession,

a. introduce competencies that will allow future teachers to take into account the range of student types and social and family situations they will encounter, and establish the necessary thresholds concerning the level of mastery

b. define the subject-specific competencies required for teaching, in all subjects, particularly in the language of instruction, and establish the necessary thresholds concerning the level of mastery

that the Minister of Education, in collaboration with universities, colleges and school boards,

5. assess the actual effect of the existing set of measures designed to ensure the competency of future teachers in the language of instruction, and establish an integrated strategy in this area

that education faculties

6. take note of the concerns and dissatisfaction expressed by schools, and take the necessary steps to ensure that teacher training graduates are better prepared for the current and future exercise of the teaching profession

that universities

7. raise the language of instruction requirements for students seeking admission to teacher training programs

PRIORITY DEVELOPMENT AREA NO. 3: ENSURE THAT ONLY FULLY QUALIFIED TEACHERS ARE HIRED AND ASSIGNED TO SCHOOLS, EVEN IF LOCAL OR REGIONAL RECRUITMENT DIFFICULTIES EXIST

The difficulty of recruiting teachers relates directly to the quality of educational services. The Conseil considers that the hiring of insufficiently qualified teachers could jeopardize the quality of the educational services dispensed and discredit the teaching profession. The question of teacher recruitment must therefore be examined carefully.

One of the issues most frequently raised during the consultation process organized by the Conseil was regarding a shortage of teachers. On many different occasions, recruitment problems were mentioned, along with an actual, or feared, shortage of teachers. However, MEQ data show that, overall, there is no shortage of teachers, although the number of teachers available in some subject areas at the secondary level is limited.

The Conseil has formulated several hypotheses that may explain this apparent shortage. They are based on the existence of a discrepancy between the overall situation in the province and the actual situation in certain regions.

First, although the number of teachers available province-wide appears to be sufficient, their geographic distribution does not necessarily match regional hiring needs. This is also true for student teachers studying in the major cities, whose future place of work is unknown.

Second, the recruitment of teachers by some school boards may be affected by specific problems, for example, in the following cases.

- The student population is growing in around 10 school board districts and the school boards concerned must recruit more teachers, not only to replace teachers who retire, but also to deal with increased enrollment.
- Some schools, urban neighbourhoods or regions may be affected by personnel movements (from disadvantaged to advantaged schools, from remote regions to urban centres, etc.).
- Several schools have difficulty recruiting supply staff or part-time teachers. Some of the organizations consulted reported an increase in applications for leave for various reasons (salary deferral schemes, maternity or paternity leave, sick leave, etc.), more time off for extra training on the education reform, and more requests for part-time schedules. A more in-depth analysis is needed to determine the extent of these trends and their actual effect on the recruitment of supply staff and part-time teachers.

Last, the Conseil wonders whether the use of employment priority lists[10] and the "competency criterion"[11] affects the ability of school boards to hire the most qualified candidates to fill open positions. The Conseil is aware of the need for a mechanism that ensures fairness in the distribution of regular positions, a need that is met by the employment priority lists. The "competency criterion" is also a legitimate management measure, since it introduces a level of flexibility into the assignment process. However, the Conseil considers that the effect of the two mechanisms on the balance between the training and assignment of teachers should be studied.

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10. Potential candidates for permanent positions are entered on the lists. The rules governing the management of the list are negotiated at the local level.

11. The "competency criterion" must be met by a teacher wishing to obtain a position outside his or her teaching field.

With regard to recruitment difficulties, the Conseil has noted that no province-wide teacher shortage has been forecast by the MEQ, but that difficulties exist at the regional and local levels. The Conseil considers that the question of recruitment should be given priority, because it could have a major impact on the quality of the educational services received by the students. Vigilance is necessary to ensure that recruitment difficulties do not lead to the hiring of under-qualified staff.

Considering that

- although no Québec-wide shortage of teaching staff has been forecast, local or regional recruitment difficulties have been reported in certain regions and subject areas
- the supply and demand process for teaching staff must take into account various facts, including
  - the recruitment of mathematics and science teachers
  - the situation of school boards with increasing enrollment
  - schools with particular profiles:
    - schools in disadvantaged areas
    - schools in remote or rural regions
    - schools with a specific training project
  - an increase in the leave granted and the number of part-time positions, reported by several organizations, and the possible effects of the increase on teacher recruitment difficulties
- the use of employment priority lists and the "competency criterion" should not have a negative impact on the balance between training and assignment and the quality of educational services

the Conseil recommends

that school boards and local unions

8. **integrate professional standards for the teaching profession into their teacher assignment process**
9. **ensure that professional standards are taken into account even during periods of recruitment difficulty**

Guideline 2:
Support teachers' ongoing development of professional competencies and officially recognize this expertise

In its second guideline, the Conseil states the need to establish conditions conducive to the ongoing development of professional competencies by teachers, based on the needs they encounter during their career. The Conseil considers that official recognition should be given for the expertise developed by teachers, in keeping with the emphasis on the professionalization and restored value of teaching. For this purpose, it suggests three priority development areas, concerning the need to supervise the entry of new graduates into the profession, the need for teachers to take responsibility for their own professional development, and the need to develop genuine career paths for teachers.

Priority development area no. 4:
Supervise the entry of new teachers into the profession to ensure fairness, and consider their basic training as the entry threshold for the teaching profession

During the consultation process established by the Conseil, several organizations stressed the importance of entry into the teaching profession and the need for a mechanism to make it easier for new teachers to enter the profession. Currently, the entry procedure is not conducive to the development of professional competencies by new teachers, or to the provision of high-quality instruction for students.

The entry problem is serious, and reflects the lack of recognition for the teaching profession. It has two main aspects, which sometimes affect new teachers simultaneously. The first is the lack of job security. Over the last 40 years, the ease with which new graduates have been able to find a position has varied greatly. During the 1960s and 1970s, it was easy for new graduates to find a regular position, since the development of a universal education system led to an explosion in the demand for teachers and many regular positions became available. Beginning in the 1980s, the situation became more difficult, since there were more graduates than positions available. From the early 1980s to the mid 1990s, newly qualified teachers had no job security, a situation that often lasted for several years, and many simply left the profession after years of fruitless searching for a permanent position. Until the mid 1990s, this over-supply of teachers led to long periods of low job security for new teachers. Since the mid 1990s, various measures have helped to improve the employment situation.

In general, it is fair to state that the period of little or no job security has been reduced considerably over the last 20 years. What has not changed, though, is the fact that new entrants never enjoy job security. In Québec, entry to the profession is not assured through competitions, or access to regular positions. In addition, even though the waiting period for gaining access to a position has been reduced, it is estimated that new graduates still have to wait three or four years before qualifying for a full-time position, after which they only gain tenure on signing their third annual full-time contract.

Even after obtaining tenure, new teachers often have to deal with heavy workloads due to the assignment process. In many cases, teaching positions are assigned on the basis of length of service, which means that newly qualified teachers are at the bottom of the list and are assigned to the remaining, and often least attractive, positions.

In the view of the Conseil, the difficulties of the entry process raise three main problems.

1. Workload equity: the Conseil considers that there is often an imbalance between the workloads of new teachers and those of experienced teachers, given their respective competencies.
2. Teaching quality: the Conseil considers that basic teacher training does not prepare teachers sufficiently to face the worst conditions in the profession. A new teacher having to face an overly complex task is unable to consolidate the competencies that he or she began to develop in basic training.
3. Retention of new teachers: in Québec, it was estimated in 1998 that about 17% of teachers left the profession in the first five years. Is the "teacher dropout rate" a problem in Québec? Should a certain percentage be considered normal? What is the retention rate in other sectors of activity? All these questions must be answered before an enlightened judgment can be made. However, it is already possible to formulate the hypothesis that at least some of these new teachers would not have left the profession if they had received more support when they started teaching.

The Conseil believes that entry into the profession must be considered as a normal and legitimate stage in the career of a professional teacher. If basic training constitutes the threshold for entry into the profession, entry should be seen as a collective responsibility and not as the sole responsibility of the new teacher. From this point of view, entry should be considered as part of

the career diversification process, in the sense that the task of mentoring new teachers should be recognized, that this task should become compulsory, and that mentoring expertise should be developed by the members of the teaching team and shared between them.

Similarly, based on the principle of workload equity, diversification must be reflected in real life by a sharing of tasks based on the actual capacity of each teacher to ensure the quality of the educational services provided. The most complex tasks should be the most highly valued, since they require the greatest professional competencies. They should be taken on by the most experienced teachers, be officially recognized, and be provided with appropriate support.

The Conseil considers that a more firmly supported entry process would make the teaching profession more attractive, and more highly valued. Recognition for the importance of supporting new teachers would lead to recognition for the complexity and difficulty of teaching, and highlight the importance placed on the quality of the educational services dispensed to students. Similarly, a failure to take into account the inexperience of new teachers amounts to a failure to recognize the value of the experience of working teachers in terms of their ability to take on complex tasks.

Considering:

- the high rate of staff turnover in schools
- the fact that entry into the profession is a normal and necessary stage in a teacher's development
- the importance of basing entry into the profession on the principle of equity, and of considering basic teacher training as the threshold for entry into the profession
- the fact that a difficult entry period leads to a drop in the quality of the services provided, when the difficulties of the workload exceed a new teacher's actual capacities, creates a feeling of worthlessness and sometimes results in the teacher leaving the profession
- that school principals have a duty, as prescribed by law, to ensure that the educational services provided at the school meet the proper standards of quality
- that teachers have a duty, as prescribed by law, to "collaborate ... in the mentoring of newly qualified teachers"

the Conseil recommends

that the Minister of Education

10. establish measures to support the entry of new teachers, especially those with no job security, in all schools and school boards

that school boards and school principals

11. determine ways to implement the measures aimed at new teaching staff to ensure that all actions taken are relevant and effective, drawing inspiration from successful current approaches, the expertise developed by teachers, and ongoing research into the entry into the teaching profession

12. when assigning positions and allocating tasks to new teachers in a given school, take into account the teachers' actual level of competency, in terms of their ability to ensure the quality of the educational services they provide

that the teachers in a given school

13. consider the mentoring needs of their new colleagues and work with the principal to implement appropriate support measures

PRIORITY DEVELOPMENT AREA NO. 5: ENCOURAGE TEACHERS TO TAKE RESPONSIBILITY FOR THEIR OWN PROFESSIONAL DEVELOPMENT

One of the reasons for considering teaching a profession is that it involves complex, and constantly evolving, challenges that require teachers to continuously update their professional competencies. Many countries also recognize the need to ensure that teaching practices are developed on an ongoing basis to support changes to the school system and increase student success rates.

Recent research on professional development for teachers, together with MEQ guidelines on this topic, show that the heart of the question concerns the ability of teachers to take charge of their own professional development. In the view of the Conseil, this constitutes an important key for restoring the value of the profession and the quality of the services provided in schools, both now and in the future.

In general, the stakeholders consulted by the Conseil agree on the fact that a new approach to professional development is needed. For many organizations, professional development is closely linked to the question of professional

identity and competency, and could provide the refresher training needed to reduce the disillusionment felt by teachers. Other organizations see it as a lever for the professionalization of teaching and as a strategy to encourage organizational change. Some consider that professional development should be compulsory, while others think it should be voluntary. All agree, however, that its importance should be recognized. However, the organizations queried the actual degree of access teachers have to professional development and, especially, its relevance in terms of their actual needs.

The Conseil believes that it is important to find ways to allow teachers to take charge of their own professional development, and makes the following suggestions in this connection.

Ensure that training needs are clearly expressed as part of an organized approach to professional development

The Conseil believes that teachers must focus on clearly and systematically expressing their training needs. This is a key challenge, since there is a difference between vaguely expressed wishes and an actual taking charge of professional development by teachers. In the view of the Conseil, the following three parameters should be taken into account when training needs are expressed:

1. existing measures: the reference framework for professional competency, the prescribed education programs, etc.
2. the context in which teachers work: the characteristics and priorities of Québec schools, the needs of students, projects organized individually or in groups
3. the degree of individual competency achieved

The question of ensuring that the training needs of adult education teachers are clearly expressed is one of the current concerns of the Conseil's Commission de l'éducation des adultes. This is based on the conviction that training should be adapted to the training needs and aspirations of the adult learners rather than the teachers, and that training needs must be made explicit and must be taken into consideration. Ways must be found to assess the current degree of mastery of a set of professional competencies, to plan activities in order to reach the desired degree of mastery, and to assess the overall process both in terms of the approach used and the results achieved. The Conseil stresses the importance of developing the tools required to allow teachers to take charge of their own professional development, both in terms of the approach applied and way training needs are expressed, taking account current experience in this area.

Improve access by teachers to a wide range of training activities to develop their competencies

Teachers must be able to choose from a wide range of activities to select those they need to develop their competencies. Besides the professional development activities offered by school boards, many other training opportunities exist: pedagogical development, peer training, research involvement, the mentoring of new and trainee teachers, documentary research, etc. The key point is that all these activities must be part of a planned process designed to allow teachers to learn and, more broadly, develop on a professional level.

The Conseil considers that teachers can develop their competencies in many different ways, provided the activities are made available and that the teachers can reinvest what they have learned in their teaching. From this point of view, the acquisition of a self-analysis competency through the professional development process is of primary importance.

Use collective pedagogical projects for professional development purposes

After consulting groups of teachers involved in a collective pedagogical project, the Conseil considers that the potential of the projects can be exploited for professional development purposes, because

1. collective projects have already been established in schools to meet the needs of students
2. the education reform promotes the development of a collegial approach between schools, and an increase in collaborative work is to be expected
3. collective projects, in addition to their benefits for student learning, allow teachers to develop professional competencies

The results of the consultation process show that teachers have reported some of the key impacts of collective projects on their teaching practices, and that beyond the actual pedagogical objectives of the projects, they also generated individual and group reflections about pedagogical practice. In other words, the projects can become the basis for a process to transform teaching practices.

Focus on the individual and collective responsibility of teachers

MEQ guidelines for the professional development of teachers clearly assign individual and joint responsibility to the teachers themselves. Under the *Education Act*, teachers must maintain their professional competencies, meaning that they must be engaged in a professional development process. They must also determine their training needs on the basis of their personal needs, and the needs and priority of the school in which they work. In addition, training needs must be defined collectively by each school team. Professional development is therefore both an individual and a collective process. Moreover, teachers must assess the outcome of the professional development process and suggest improvements.

School principals are required to consult teachers concerning their training needs, inform the school board of the needs and organize professional development activities. The *Education Act* states that principals are responsible for ensuring that education services in their school meet the proper standards of quality. Under MEQ guidelines, principals are responsible for monitoring and evaluating individual and collective training projects.

In the view of the Conseil, all of these points must be embodied in concrete measures. The primary responsibility of teachers is to be engaged in a professional development process, which can vary in terms of its objectives, the resources and activities it involves, and the pace at which new competencies are developed. It is clear to the Conseil, however, that all teachers must be engaged in a professional development process that is significant for them and that they report their progress to their school principal, who is responsible for ensuring the quality of the educational services provided to students.

Considering:

- that the *Education Act* stipulates that teachers must "take the appropriate measures to attain and maintain a high level of professionalism"
- the need to ensure that teachers take charge of their own professional development
- the fact that individual and collective responsibility of teachers could be used as a lever to ensure that teachers take charge of their own professional development
- the need to ensure that teachers' training needs are clearly expressed if a rigorous professional development process is to be established

- the importance of using a wide range of activities and the potential offered by collective pedagogical projects to develop teachers' competencies
- the fact that pedagogical supervision by school principals gives teachers an opportunity to report on the progress made in terms of professional development

the Conseil recommends
that teachers
14. define flexible individual professional development plans that reflect their personal and professional needs, and also the needs and priorities of their school, and report on their progress to the school principal

that school principals, in collaboration with their school team,
15. establish a professional development plan for their school that sets priorities for the training activities requested from the school board, and monitor its implementation

that school principals
16. ensure that teachers have access to a wide range of learning activities that allow teachers, individually and collectively, to take charge of the process to develop their competencies

PRIORITY DEVELOPMENT AREA NO. 6: ESTABLISH GENUINE CAREER PATHS FOR TEACHERS

The Conseil considers that the establishment of career paths to allow the recognition, development and sharing of teachers' expertise would increase both the social standing and the attractiveness of the teaching profession.

Currently, a teaching career offers few possibilities for diversification, apart from horizontal moves such as changing classes or schools, but this still involves the same work, namely teaching students. A handful of possibilities do exist, such as a move to become an educational advisor, a pedagogical coordinator at a school board or a school principal, or a temporary position on secondment to the MEQ.

However, an inquiry by the Conseil in 1991 showed that elementary and secondary school teachers would be interested in career diversification proposals that involve tasks other than teaching. The Conseil does not, however, wish to give the impression that teaching is a boring or routine task. On the contrary, it considers that it is a unique, complex act that is a

major source of professional enrichment. However, a diversification of the tasks performed by teachers would encourage them to develop and share other expertise.

Many teachers already volunteer to perform functions apart from classroom teaching, often for little recognition. While they sometimes offer minimal compensation, they are mostly performed by individuals who have a passionate interest in a particular theme who find that they offer an indispensable bonus to their profession. To what extent, however, is their expertise reinvested more broadly in the education system? How can the education system recognize and benefit from this expertise as it tries to meet the needs of students and ensure their success? The Conseil considers that more work needs to be done in this area.

In the view of the Conseil, career and task diversification is a necessary step towards the professionalization of teaching. One of the conditions for professionalization is recognition for teachers' expertise, which involves rationalizing the knowledge on which it is based, determining the competencies needed to exercise the task involved, and reinvesting the competencies in basic and ongoing professional development training to ensure that the expertise can be developed and put to use.

In this way, over time, teachers can develop expertise that must be rationalized and shared to allow all students to benefit from it. A constant search for greater teacher effectiveness is one of the requirements of professionalization. Job diversification for teachers could also help establish a better interface between teaching and university research, since supervising trainee teachers and participating in research projects, for example, are activities that teachers almost always pursue in partnership with a university.

The Conseil therefore recommends that all the duties performed by teachers should be rationalized and recognized. This would involve two types of process. First, genuine teaching career paths would have to be organized; second, the reference framework for teaching competencies would have to be broadened to include all the duties performed by teachers. The Conseil considers that various possible ways to organize teaching careers should be examined. They could include the creation of separate positions, accessible through competitions, with a separate pay scale, or the establishment of salary bonuses to recognize the expertise of teachers who master the competencies needed to take up new duties.

Considering:

- that the world of teaching involves several duties that go beyond and enrich the act of teaching
- the need to provide official recognition for
  - all the duties performed by teachers, in keeping with the emphasis on the professionalization and the restoring of the value of teaching
  - the fact that the level of mastery required in various professional competencies varies depending on the position held
- the impact of the development of new duties on
  - basic training and the development of professional competencies
  - cooperation and partnerships developed between universities and schools
  - the quality of the services provided by teachers in performing all their duties

the Conseil recommends
that the Minister of Education
17. introduce diversification into the positions held by teachers, by
a. establishing competency profiles for teaching that group all the duties performed by teachers, based on job analyses and relevant research into teaching practices
b. providing official recognition for the range of duties performed by teachers, using various possible approaches such as
- **a wider range of possibilities for teacher release[12] to take into account the actual weighting of the duties performed by teachers**
- **the development of formulas for service loans between schools, school boards, socioeconomic organizations and the MEQ, to ensure the pooling of expertise and promote partnerships between the various stakeholders in the world of education**
- **the creation of specific positions, accessible through competitions, for the performance of duties that are significantly more complex, in other words, duties that require a wider range or higher level of professional competencies, and the provision of suitable pay scales**

12. Teacher release is an administrative measure that releases teachers from some or all of their teaching duties to devote their time to other activities connected to teaching.

that universities

18. extend the scope of their research into teaching practices to include all the duties performed by teachers, in order to set up a knowledge base to cover all duties

Guideline 3: Continue to promote professionalization of teaching in the way the profession is exercised and managed

The Conseil considers that more emphasis is placed on the professionalization of teaching in basic training than in the way the profession is currently exercised and managed. The orientations for basic teacher training have, since the reform of the teacher training programs in 1994, been based on a vision of teachers as professionals. Even though–as shown elsewhere by the Conseil–basic teacher training still requires some improvement, the principles on which it is based are relatively clear and recognized by all stakeholders. However, the way the profession is organized, in terms of both day-to-day teaching and teaching management, are not as clearly structured around the idea of professionalization. The Conseil suggests two priority areas for development to allow teachers to take greater responsibility for the profession, both in terms of daily work organization and management of the profession itself.

PRIORITY DEVELOPMENT AREA NO. 7: SUPPORT THE AUTONOMY OF TEACHERS IN THE WAY THEY ORGANIZE THEIR WORK, AND DEFINE THE PARAMETERS OF PROFESSIONAL RESPONSIBILITY

The Conseil considers that, by placing more emphasis on teachers' autonomy and responsibility, the social prestige of teaching, and a feeling of competency among teachers, would both be increased. By taking full advantage of the professional latitude they enjoy, teachers exercise greater control over the way their work is organized and are able to take the lead in pedagogical matters. In addition, by accepting the idea of accountability, teachers accept the need to recognize their expertise and that of other stakeholders, revealing the full extent of their expertise and the complexity of their duties.

Two types of actions must be undertaken. First, it is important for teachers to be given a greater degree of control over the way their work is organized; second, it is important to establish accountability mechanisms to promote recognition of teachers' competency.

Take full advantage of the current provisions for professional autonomy

The Conseil considers that teachers must be able to use all their existing leeway to create optimal learning conditions for students. The reform offers a special opportunity for the implementation of new approaches, because of the emphasis it places on a collegial spirit and teachers' expertise and autonomy. Professional autonomy must be exercised not only in the organization of day-to-day teaching work, but also in relations with other stakeholders, including parents, and in the participatory mechanisms provided for certain objectives in the *Education Act*.

Define the parameters of professional responsibility

Greater professional autonomy goes hand-in-hand with the obligation of accountability. However, it is first necessary to define the responsibilities for which teachers are accountable. What exactly are teachers responsible for? The Conseil considers that their basic responsibility should be defined as an obligation of competency, with a corollary obligation to be accountable for their competency.

Rather than an obligation of results or of means, the Conseil prefers an obligation of competency, one that is more in line with section 22 of the *Education Act*, which specifies that teachers must "take the appropriate measures to attain and maintain a high level of professionalism" (section 22). An obligation of competency focuses on a teacher's choice of methods, in other words, on his or her expertise. The obligation, therefore, is linked to the quality of the methods employed, rather than on the results achieved. Behind the obligation of maintaining their level of competency lie the twin questions of ongoing professional development and the assessment of competency, in other words, teacher evaluations.

The Conseil considers that the obligation of competency stipulated in the *Education Act* requires the implementation of mechanisms to allow teachers to demonstrate that they have met that obligation. This means that teachers must be willing to allow teaching to become a public, rather than a private, act if their competency is to be recognized and legitimized.

Schools are in the strongest position to determine how this should be achieved. The Conseil suggests that two dimensions of the obligation to demonstrate competency should be considered:

1) An individual obligation to demonstrate ongoing professional development:

- The obligation of competency creates an individual responsibility for teachers to pursue their professional development on an ongoing basis, and a related obligation to report their progress to their school principal (see priority development area no. 5.)

2) A collective obligation involving an institutional evaluation, including a formative evaluation of teaching:

- The Conseil has previously stated its appreciation of the institutional evaluation process for schools, and its importance as part of a decentralized management system that includes an obligation of accountability. In the view of the Conseil, education stakeholders have a duty to report on the way in which they pursue their mission, and this can be achieved through an institutional evaluation. This means that the obligation of competency for teachers will also require the implementation of formative evaluation measures as part of an institutional evaluation.

Considering:

- the importance, for teachers, of taking greater collective control over the organization of the pedagogical aspects of their work, and of redefining their responsibilities in this regard
- the need to maximize the professional involvement of teachers in the areas defined in the *Education Act*, by ensuring their active involvement in the various mechanisms established by the Act
- the need to define the parameters of teachers' professional responsibility, taking into account
  - the individual responsibility of teachers to report on their professional development to their school principal, who is responsible for maintaining the quality of the educational services provided in the school
  - the importance of institutional evaluations, including teaching assessments, in the quest to ensure that the educational services received by students are of the highest possible quality

the Conseil recommends

that the Minister of Education

19. define the parameters of teachers' professional responsibility concerning

a. the maintenance and development of their professional competencies

b. formative teacher evaluations, as part of an institutional evaluation designed to ensure that the educational services received by students are of the highest possible quality

that school principals, in collaboration with teachers,

20. determine procedures to allow teachers to report on the way in which they assume their professional responsibilities, taking into account

a. the parameters of teachers' professional responsibility, outlined above

b. the legal obligation for teachers to maintain a high level of professionalism

c. the legal obligation for principals to ensure that the educational services provided at the school meet the proper standards of quality

that school boards, school principals and local unions

21. maximize professional involvement by teachers

a. by providing teachers with the necessary information and conditions for contributing fully to existing participatory mechanisms

b. by distinguishing clearly between participatory mechanisms and labour relations mechanisms

PRIORITY DEVELOPMENT AREA NO. 8: PROVIDE SUPPORT FOR THE PROGRESSIVE EMPOWERMENT OF TEACHERS WITH REGARD TO THE MANAGEMENT OF THE TEACHING PROFESSION, AND IMPROVE MECHANISMS LIKELY TO ENSURE PUBLIC CONFIDENCE IN TEACHERS

The Conseil considers that teachers must show more leadership in the development of the teaching profession. However, many questions remain concerning the best way for teachers to be represented, and the sharing of responsibility for management of the teaching profession. The results of the consultations organized by the Conseil show that the debate has become polarized around two positions, one for and one against the creation of a professional order for teachers. The Conseil has also noted that most efforts are directed at promoting these two options, rather than examining in depth the issue of the development of the teaching profession. The Conseil considers that it is important to take note of the current context when reflecting on the management of the teaching profession, and it suggests various guidelines to support further debate.

The current responsibility of the Québec government for the teaching profession

Currently, the main mechanisms governing the teaching profession are under the responsibility of the Ministère de l'Éducation, and therefore of the Québec government. Several consultations have been carried out by the MEQ in connection with various policies and guideline documents, such as the reference framework for teaching competencies or the professional development guidelines. In addition, teachers are represented on bodies such as the COFPE and the CAPFE. However, legal responsibility for the teaching profession still lies with the government. In other words, regardless of the consultation and participatory mechanisms it has established, the government remains accountable to the population for decisions made concerning the management of the teaching profession.

The central question in the current debate is whether or not it is relevant and legitimate that the government have responsibility for management of the teaching profession.

- Which stakeholders should be responsible for management of the teaching profession?
- What type of structure (government department, committee, commission, board, agency, etc.) is currently in the best position to govern the teaching profession?

The Conseil's examination did not address these two questions specifically, but looked at the teaching profession in a more general way. The request made by the Minister of Education was more concerned with the foundations of the teaching profession than with the question of responsibility for, and management of, the profession. However, the question cannot be avoided in an examination of the significance that should be attached to the teaching profession.

Involvement by teachers in the management of the profession as a condition for professionalization

In its description of a professional ideal for the teaching profession, the Conseil stressed the importance of involvement by teachers in defining the mechanisms used to govern the profession. The Conseil considers that the literature dealing with professionalization clearly indicates that teachers cannot lay claim to professional status unless they are involved in determining the various aspects of their own profession, since involvement is one of the conditions that define a profession. The Conseil believes that teachers must help make all decisions concerning the management of the profession, because they are the people who experience the day-to-day realities of teaching.

Balanced leadership in the management of the teaching profession

The Conseil considers that a balance must be struck between, on the one hand, allowing all aspects of the profession to be determined by teachers and, on the other, doing nothing. This balance can change depending on needs and circumstances. In the view of the Conseil, teachers must be gradually empowered to take on management of the profession to allow them to develop new competencies and show more leadership.

Given the current polarization of the debate concerning management of the profession, the Conseil considers that a gradual process is needed to allow teachers to develop the necessary expertise and take the lead in a more assertive fashion in the development of the teaching profession, in partnerships with other education stakeholders. However, it also considers that the status quo is not an option that will promote professionalization. In other words, the Conseil considers that a new sharing of powers is now necessary.

The Conseil believes that the first stage to consider is the launching of a constructive debate on the management of the teaching profession, to allow a plan of action to be established as quickly as possible, and jointly, by all the parties sharing responsibility for education in Québec. It also believes that priority must be given to the elements identified by the Office des professions du Québec as the weakest links in the profession: permanent teaching licences, teacher evaluations, and supervision of the profession.

Considering:

- that the involvement of teachers is a condition for professionalization
- that the trend towards decentralization in education must also apply to the management of the teaching profession, and that the MEQ should no longer have sole responsibility for management
- that education is a public service and that decisions concerning education must be made as part of a political decision-making process that "removes these issues from the private domain and makes them subject to the analysis and resolution mechanisms with input from society as a whole via shared decision-making institutions" (CSE, 2001a, p. 59, free translation)
- that management of the teaching profession is a focus of current debate
- that the *status quo* in management of the teaching profession is not a solution likely to promote professionalization
- that teachers must gradually take over management of the profession in order to achieve restored value and professionalization
- that some management mechanisms must be improved to ensure the credibility and valuing of the teaching profession

the Conseil recommends

that the Minister of Education

22. support a gradual shift in responsibility of the teaching profession to teachers

23. instruct an independent commission to redefine the management parameters for the teaching profession, in keeping with the goals of professionalization and valuing of teaching; the commission would be

a. independent, in that its members would not be bound by an obligation to represent a given group[13]

b. multi-party, but with a majority of preschool, elementary and secondary school teachers

13. This excludes people acting as spokespersons for a group or organization, of any kind.

The commission would be required to answer the following **three questions,** in particular:

1. Which stakeholders should be responsible for the management of the teaching profession?
2. What type of structure (committee, commission, board, agency, professional order, etc.) would be best able to manage the profession?
3. What would be the best way to move from the current situation to the target situation?

The **mandate** of the commission would **not exceed twelve months,** and it would be required to examine

a. the management of supervisory mechanisms for the teaching profession

- the drafting and updating of professional standards for teaching, taking all dimensions of the profession into account
- the accreditation of basic teacher training programs
- regulations connected to teaching licences, and their application
- professional development guidelines for working teachers
- the drafting and application of a shared code of professional conduct
- complaint management mechanisms

Priority would be given to the aspects of the profession that, in the opinion of the Office des professions du Québec, are the weakest links:

- permanent teaching licences
- teacher evaluations
- discipline (to strengthen investigative mechanisms and make the process more credible for both teachers and the general public)

b. the preparation of a plan of action to ensure the effective implementation of its recommendations

Note concerning all recommendations:

If the responsibilities for the management of the teaching profession become shared in a new way, the recommendations contained in this brief should apply to the party whose mandate includes the responsibility concerned.

CONCLUSION

This brief examines the foundations of the teaching profession and the ways in which it could be developed to further the objective of professionalization. From the beginning of its work, the Conseil decided to take into account the changes that have occurred in the profession over the last 40 years. As early as 1992, the Conseil stated that Québec society should enter into a new social contract with teachers, and that the social contract should take into account the professional nature of the work carried out by teachers. In 2004, a solid new basis for the future development of the teaching profession has been achieved, and this in itself demonstrates how much progress has been made. However, professionalization has not progressed in a linear fashion, but instead in a series of successive waves, depending on the obstacles and difficulties encountered. The Conseil believes that the current context is favourable for the move towards professionalization, for various reasons outlined in the preceding pages, and that it is time to build on what has been accomplished. This brief is intended to mobilize teachers and support the objective of professionalization in the teaching profession, by supplying guidelines, principles and points of reference to continue the work begun 40 years ago.

In this conclusion, the Conseil considers that it is necessary to issue two important messages to education stakeholders. The first concerns teachers, who are directly affected by all the recommendations made, regardless of who is responsible for implementing each recommendation. The second concerns all the stakeholders.

The message to teachers is that the brief made public here sets out a vision for the future of the teaching profession. The Conseil has suggested key guidelines that, in its opinion, could help develop a profession that is stronger, better organized and has its value restored. The objective of this brief is to provide points of reference for the short-term, but especially the medium-term and long-term development of the teaching profession. The Conseil has noted the concerns expressed by certain stakeholders who have pointed out that sometimes a major gap exists between the situation in the field and the vision for the future proposed here. In reality, the teaching profession develops at various paces, depending on the local environment. This is entirely legitimate. In this brief, the Conseil invites teachers to focus on developing their own competencies, claim recognition for their expertise, and acquire more power to influence the way in which the profession is managed. Above all, the members of the profession must raise the value of the profession in their own eyes if the value of teaching

is to be restored in Québec society as a whole. The Conseil has the conviction that teachers have control over their own professional destiny, and that is why it has issued this call to action.

The message to education stakeholders is that teachers alone cannot bring about the development of the teaching profession. The Conseil is aware that this brief proposes a series of upheavals that will have consequences outside the teaching profession. The empowerment of the teaching profession will require a paradigm shift not just among teachers, but also among all partners: the MEQ, school boards, school principals, members of governing boards, other categories of staff, and parents. The work must be carried out in synergy. The current education reform, in its curricular, administrative and pedagogical aspects, and the professionalization of the teaching profession share a common goal–to return power to the players in the field to allow them to respond to the full range of student needs. In addition to a paradigm shift, it also requires a measure of creativity and–as the Conseil is well aware–courage and determination.

In addition to the paradigm shift, the Conseil considers that, if teachers are to move towards their professional ideal, the other stakeholders will have to examine the conditions in which the renewal will take place. Today, teachers are living through a period of turmoil that involves many different changes–it could almost be considered a switch to a culture of continuous change. For innovative, creative teachers with full confidence in their expertise, this can be a stimulating time. However, for all teachers, the changes can be a major source of stress and lead to excessive workloads when the changes come together. For this reason, it is important to consider the current context carefully. Although the Conseil firmly believes that it is necessary to progress towards a professional ideal, it would like to point out that it is also important to listen to the needs expressed by teachers.

Finally, in the opinion of the Conseil, the objectives outlined in this brief are challenging, but not foolhardy. The professional ideal it proposes is not radically different from the ideal put forward by various players in Québec society over the last 40 years. Rather, it is intended to provide new impetus for professionalization, by taking advantage of the possibilities offered by the current reform and the intrinsic valuing of the teaching profession. Ultimately, behind the questions that involve the teaching profession and the current reform lies the very important issue of success for Québec students.

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Note. – The use of the masculine in this document also includes women.

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INTRODUCTION

The role of the **Service du répertoire toxicologique** of the **Commission de la santé et de la sécurité du travail** (CSST) is to inform Québec employers and workers of the health and safety hazards of chemical or biological substances used in the workplace.

The purpose of this guide is to facilitate the understanding and use of the information provided on a material safety data sheet by defining, for example, a product's properties and by showing how to use the MSDS for prevention. A glossary of the main terms used in material safety data sheets, the measurement units, and the conversion factors most frequently used are also presented in the appendix.

WHMIS
WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

WHMIS is a Canada-wide system for protecting the health and safety of workers by facilitating access to information on the hazardous materials used in the workplace. This system consists of three parts, namely material safety data sheets, labels and the worker training program.

For more information on WHMIS, consult the *Regulations* section of this guide.

MATERIAL SAFETY DATA SHEET (MSDS)

A material safety data sheet is a document that provides information on a controlled product, namely its toxic effects, the protective measures for avoiding overexposure or chemical hazards, and the procedures to follow in an emergency. A controlled product is a hazardous material meeting the hazard criteria defined in the *Controlled Products Regulations*. The information provided on the MSDS completes the information that is found on the label of a controlled product. The supplier sends the MSDS to the employer when the product is sold. It must be available in French and in English, be kept on the premises by the employer in a location known by the workers, and be easily and rapidly accessible to those who are likely to come in contact with the product.

INFORMATION TO DISCLOSE ON THE MATERIAL SAFETY DATA SHEET

The material safety data sheet must contain nine categories of information. They can be presented under the following headings or under equivalent headings.

- Product information
- Information on the preparation of the MSDS
- Hazardous ingredients
- Physical data
- Fire and explosion hazards
- Reactivity data
- Toxicological properties
- Preventive measures
- First aid measures

The internationally harmonized material safety data sheet, consisting of 16 categories of information, is accepted in Canada insofar as it contains the information required by WHMIS and that it mentions that the product has been classified in accordance with the hazard criteria listed in the *Controlled Products Regulations*.

PRODUCT INFORMATION

This section of the MSDS includes the following:

- Product identifier/name.
- Manufacturer's name, street address, city, province, postal code and emergency telephone number.
- Supplier identifier/name, street address, city, province, postal code and emergency telephone number, if it is different from that of the manufacturer.
- Product use.

The product's name indicated on the MSDS must be identical to the name written on the label.

Example

Material safety data sheet

Product identifier/name:

Toluène/Toluene

Manufacturer's identifier/name:

Produits chimiques ABC inc.
1234, rue ABC
Montréal (Québec) Z0Z 0Z0
Emergency telephone no.: 1 800 123-4567

Supplier's identifier/name:

Distributions XYZ
123, rue XYZ
Québec (Québec) X0X 0X0
Emergency telephone no.: 1 800 987-6543

Product use:

Paint solvent

Label:

PREPARATION INFORMATION

This section of the MSDS includes the following:

- Name and telephone number of the group, department or party responsible for the preparation of the material safety data sheet.
- Date of preparation of the material safety data sheet.

The material safety data sheet must be revised at least every three years or as soon as new pertinent information becomes available.

HAZARDOUS INGREDIENTS

This section of the MSDS includes the following:

CHEMICAL NAME AND CONCENTRATION OF INGREDIENTS,

i) which are controlled products if they are present at a concentration equal to or greater than **0.1%** in the mixture (applies to ingredients that are teratogenic, embryotoxic, carcinogenic, toxic to reproduction, mutagenic and respiratory tract sensitizers). In other cases, ingredients that are themselves controlled products and whose concentration is above **1%** are disclosed;

ii) which are on the ingredient **disclosure list**, if their concentration is equal to or greater than the concentration on this list (even if the ingredient is not a controlled product as defined in WHMIS);

iii) which the supplier believes, based on reasonable grounds, **to be harmful to the health** of the workers;

iv) whose **toxicological properties are unknown**.

The concentration is defined as being the amount of a component in the total amount of the mixture. It can be expressed as a percentage (%) and interpreted as being a ratio:

- Weight of component/weight of mixture (W/W), or
- Weight of component/volume of mixture (W/V), or
- Volume of component/volume of mixture (V/V).

On the MSDS, the actual concentration of the ingredient can be replaced by one of the following permitted ranges of concentrations, namely:

- from 0.1 to 1%
- from 0.5 to 1.5%
- from 1 to 5%
- from 3 to 7%
- from 5 to 10%
- from 7 to 13%
- from 10 to 30%
- from 15 to 40%
- from 30 to 60%
- from 40 to 70%
- from 60 to 100%

CAS REGISTRY NUMBER

The CAS number is assigned by the *Chemical Abstracts Service*, a division of the *American Chemical Society*, to precisely identify a chemical substance.

LETHAL DOSE 50 (LD_{50})

This is the amount of a substance that causes the death of 50% of the laboratory animals exposed to it orally (ingestion) or cutaneously. There are other routes of entry (for example by injection), but WHMIS does not take them into account.

LETHAL CONCENTRATION 50 (LC_{50})

This is the concentration of a substance in the air that causes the death of 50% of the laboratory animals exposed to it by inhalation, generally for 4 hours.

Examples

Pure product:

Hazardous ingredient	CAS	Concentration	LD_{50}	LC_{50}
Ammonia	7664-41-7	60-100%		Rat: 2,000 ppm/4 h

Product composed of several ingredients:

Hazardous ingredients	CAS	Concentration	LD_{50}	LC_{50}
Methyl yellow	60-17-7	0.1-1%	Rat, oral: 200 mg/kg Mouse, oral: 300 mg/kg	
Ethylene glycol	107-21-1	60-100%	Rat, oral: 4.7 g/kg Mouse, oral: 7.5 g/kg Rabbit, skin: 9.5 g/kg	

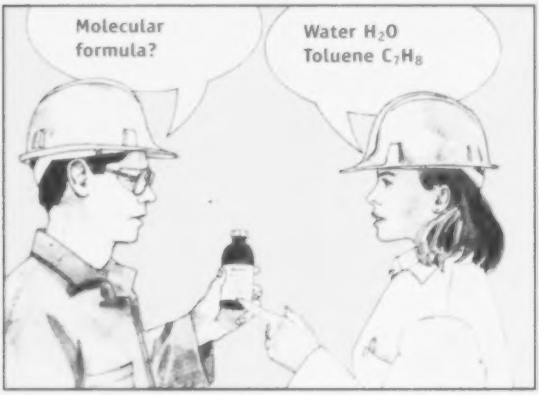
PHYSICAL DATA

This section of the MSDS describes the physico-chemical characteristics of a substance based on current scientific knowledge.

MOLECULAR FORMULA

The molecular formula describes, using their symbols, the elements that make up a substance, and indicates their proportion. Pure substances are the only ones with a definite molecular formula.

Examples
Water: H_2O, **Toluene:** C_7H_8



MOLECULAR WEIGHT

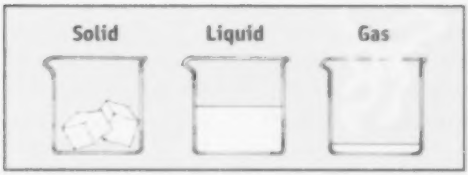
This is the weight in grams of a fixed quantity of molecules of a chemical product. The molecular weight is defined only for pure chemical substances.

Example
Toluene: 92.15 g

PHYSICAL STATE

This is the form or state in which the product is present: gas, liquid or solid at ambient temperature (20°C) and at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

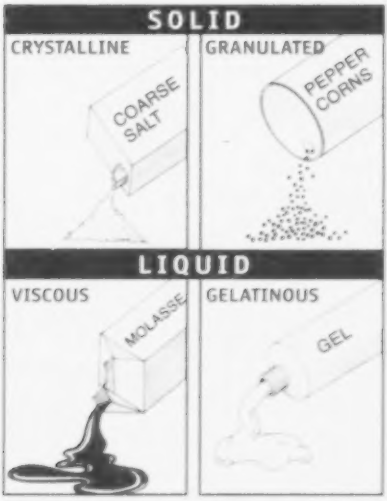
Example
Solid: lime
Liquid: water
Gas: oxygen



APPEARANCE

This subsection provides specific information on the product or presents additional information on the product's physical state or appearance.

Examples
If the product is solid, it can be crystalline, granular, powdery, etc.
If it is liquid, it can be viscous, gelatinous, oily, etc.



COLOUR AND ODOUR

These are some of the product's physical characteristics. A product can have a specific colour or be colourless. It may have a characteristic and distinctive odour or be odourless. The odour of some products may be detected, starting at a certain concentration, namely the odour threshold.

Examples

Colour:

- gray: copper sulfate
- colourless: water

Odour:

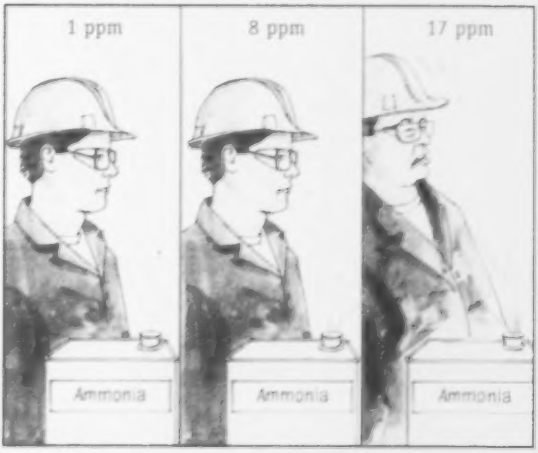
- aromatic: toluene
- characteristic: chloroform

ODOUR THRESHOLD

This is the minimum concentration of a substance likely to be detected in the air by human smell. It is usually expressed in parts per million (ppm).

Example

Ammonia can be detected at 17 ppm.



DENSITY

Density is a physicochemical property related to the weight of a substance. It represents the weight of a substance per unit volume and is expressed in grams per millilitre (g/ml) at 20°C. **Specific gravity** is also a physicochemical property that is commonly used instead of density. However, it is a relative value that indicates how many times heavier than water the product is. If the density of a product that is rather insoluble in water is less than 1 g/ml, the product will float. However, if it is greater than 1 g/ml, the product will sink. This information is useful in predicting the behaviour of a product in the event of a leak or accident.

Example
Toluene is not very soluble in water. Its density is 0.8661 g/ml, therefore less than 1, so it floats on water.

FREEZING POINT

This is the temperature at which a substance goes from the liquid state to the solid state at normal atmospheric pressure (760 mm Hg (101.32 kPa)). The freezing point of a pure substance is the same as its melting point.

Example
Water crystallizes at 0°C.

MELTING POINT

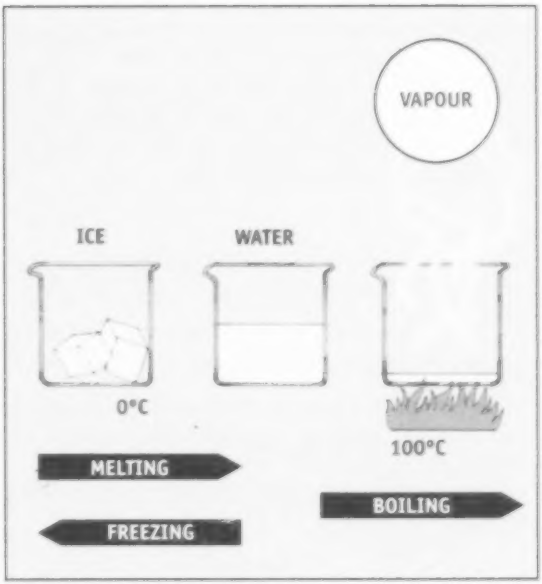
This is the temperature at which a substance goes from the solid state to the liquid state at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

Example
Ice melts at 0°C.

BOILING POINT

This is the temperature at which a substance goes from the liquid state to the gaseous state at normal atmospheric pressure (760 mm Hg (101.32 kPa)).

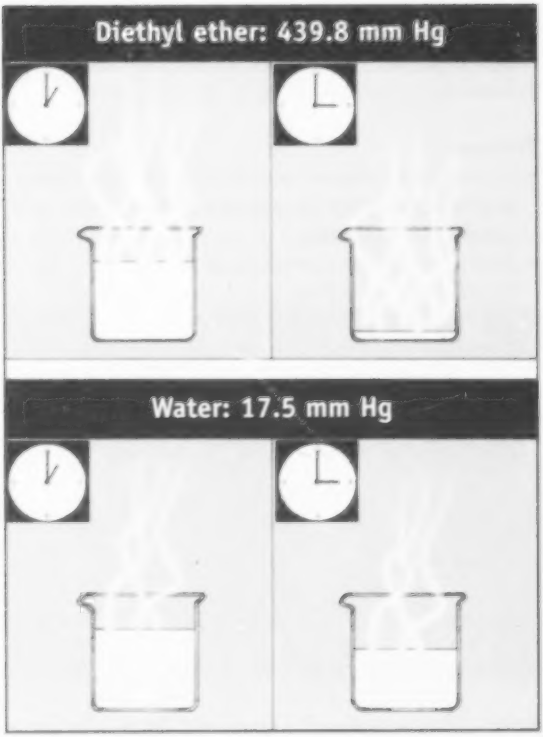
Example
Water boils at 100°C.



VAPOUR PRESSURE

When a substance evaporates, its vapours exert pressure in the ambient environment. Vapour pressure is expressed in millimetres of mercury (mm Hg) or in kilopascals (kPa) at 20°C and normal atmospheric pressure of 760 mm Hg (101.32 kPa). A vapour pressure greater than 760 mm Hg (101.32 kPa) indicates that the substance is in the gaseous state. The higher a substance's vapour pressure, the more it tends to evaporate.

Example
The vapour pressure of water is 17.5 mm Hg (2.33 kPa) and that of diethyl ether, 439.8 mm Hg (58.63 kPa). Therefore, diethyl ether evaporates faster than water.



CONCENTRATION AT SATURATION
This is the maximum concentration that a substance can reach in the air at equilibrium, 20°C and normal atmospheric pressure of 760 mm Hg (101.32 kPa).

Example
Toluene has a concentration at saturation of 28,800 ppm.

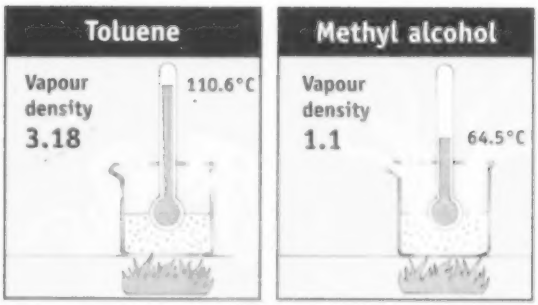
VAPOUR DENSITY

This information indicates how many times the vapours of a substance are heavier or lighter than air (air = 1). This measurement is taken at the boiling point.

If the vapour density is greater than 1, a substance's vapours will tend to remain near the ground.

Examples

- Toluene has a vapour density of 3.18. Therefore, at its boiling point, its vapours will tend to remain at the ground.
- Methyl alcohol has a vapour density of 1.1. Therefore at its boiling point, its vapours will mix easily with air, since its vapour density is close to 1.



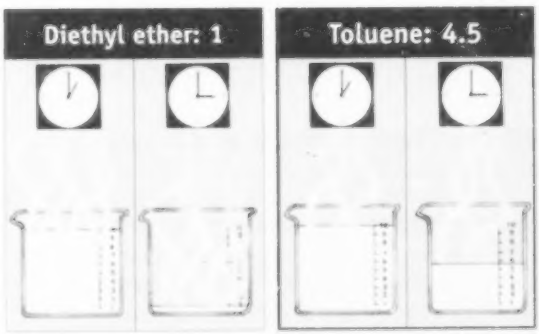
Note. – The behaviour of vapours is valid only for a rather short period of time and at a temperature close to the boiling point. The vapours given off by a boiling substance disperse into the air over time. The tendency of vapours to remain close to the ground decreases as the difference between the ambient temperature and the boiling point increases.

EVAPORATION RATE

The evaporation rate indicates the relationship between the time that a product takes to evaporate and the time that a reference product takes to evaporate. It indicates, at equal volume, how many times longer a product takes to evaporate than another. The rate varies with the type of product and the temperature. Diethyl ether, for example, is the reference product on which the most data is available.

Example

Toluene's evaporation rate is 4.5 in relation to that of diethyl ether. Therefore, toluene takes 4.5 times longer than diethyl ether to evaporate.



Note. – There are other reference products, such as n-butyl acetate, which are used to establish an evaporation rate. There are also other ways of establishing the evaporation rate. One of the methods used consists of determining, for the same period, the ratio of the volumes of the target product and reference product that evaporated. Another method consists of determining, for the same initial volume of liquid, the ratio of the percentages of the target product and reference product that evaporated. Unfortunately, sometimes a value is given without the method used being indicated.

COEFFICIENT OF WATER/OIL DISTRIBUTION
This is the ratio of the solubility of a product in oil to its solubility in water when they are brought into contact with the product.

A value below 1 indicates a better solubility of the product in oils and greases. The product is therefore likely to be absorbed by the skin. However, a value greater than 1 indicates a better solubility in water. This product could therefore be absorbed by the mucous membranes. This information can be useful in evaluating the first aid to be given and can facilitate the choice of protective equipment.

Example
Toluene has a coefficient of water/oil distribution of 0.0026. Therefore, toluene is more soluble in oil than in water with a value of 0.0026 g in water to 1 g in oil.

Note. – On some material safety data sheets, the distribution coefficient is expressed as log Pow, therefore as the logarithm of the n-octanol/water partition coefficient. n-Octanol is in fact the reference substance that is closest to oil. The method for converting log Pow into the coefficient of water/oil distribution is described in the *Conversion factors* section of this guide.

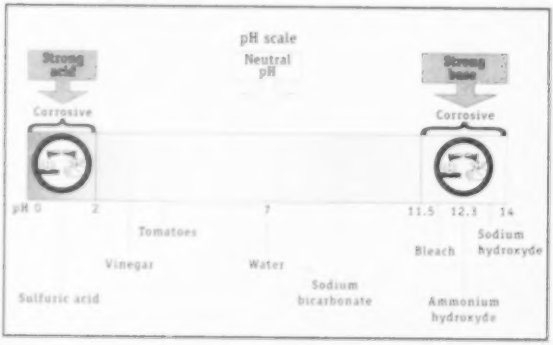
pH

The pH, expressed as a numerical value, indicates whether a solution is acidic or basic. Water is neutral and has a pH of 7. Acids have a pH below 7, and the lower the value, the stronger the acid. Bases have a pH greater than 7, and the higher the value, the stronger the base.

Examples

Vinegar (acid): pH = 2.1

27-30% **Ammonium hydroxide** (base): pH = 12.3



Note. – For regulation purposes, particularly WHMIS, a substance is considered corrosive if its pH is equal to or less than 2 or equal to or greater than 11.5. However, tests carried out on animals that prove that the substance is not corrosive predominate over the pH value.

SOLUBILITY IN WATER AT SATURATION

This is the maximum amount of a product that can be dissolved in water. It is expressed in grams per litre at a temperature of 20°C. If the solubility is not precisely known, the product is called, for example, "insoluble", "slightly soluble" or "very soluble". A liquid that mixes perfectly with water to form a single phase is called "miscible".

pH

Vinegar

Ammonium hydroxide

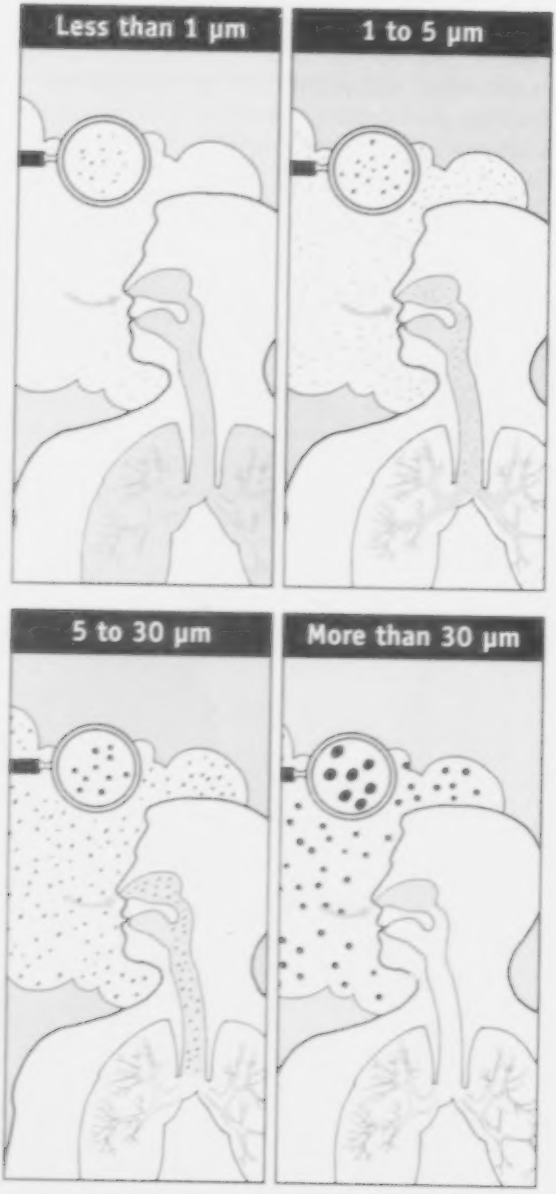
Note. –

SOLUBILITY IN WATER AT SATURATION

PARTICLE SIZE

The particle size indicates the size of the particles forming a powder, a dust, a mist, an aerosol or fumes. Particles smaller than 1µm* can penetrate deeply into the respiratory tract and deposit in the alveoli. Slightly larger particles (from 1 to 5 µm) reach the trachea, bronchi and bronchioles. Larger particles (from 5 to 30 µm) reach the nose and pharynx region. Even larger particles (larger than 30 µm) rarely penetrate the upper respiratory tract. Depending on the substance, they may dissolve and be absorbed by the body. Therefore, by knowing the size of the particles of a substance, one can decide on the corrective measures to adopt to reduce or eliminate the hazard at source (for example, by planning for local ventilation). If it is impossible to reduce or eliminate the hazard at source, knowledge of the particle size will make it easier to choose the respiratory protection device.

* 1 µm (micron) represents 10^{-6} metres (0.000001 metre) or 10^{-3} millimetres (0.001 mm). For example, 1 µm is approximately 1,000 times smaller than a grain of sand.


Less than 1 µm
1 to 5 µm
5 to 30 µm
More than 30 µm

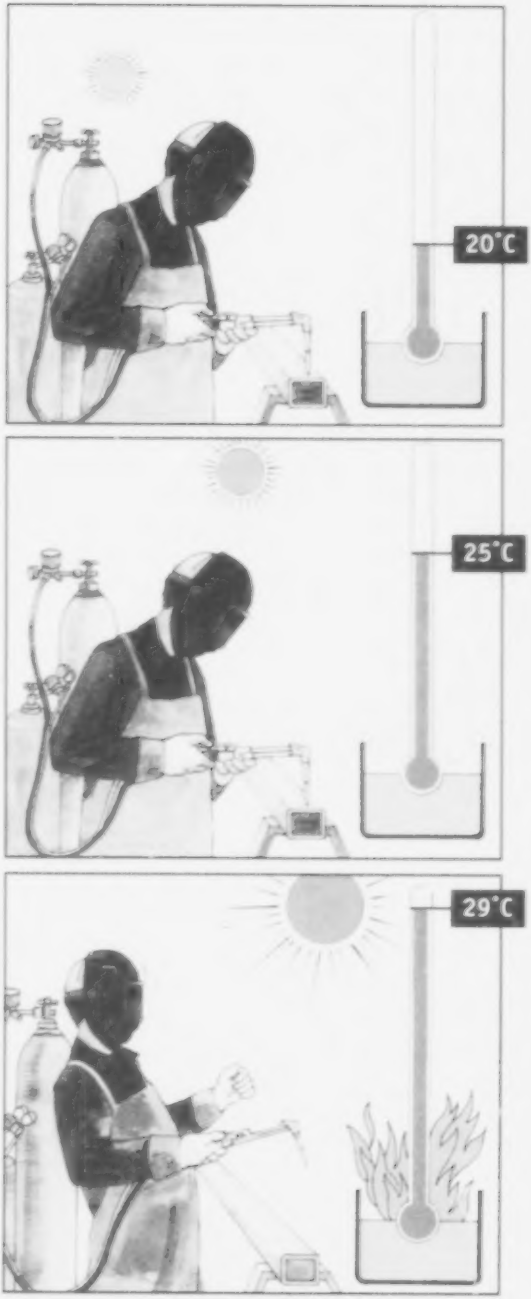
FIRE OR EXPLOSION HAZARD

FLASH POINT AND METHOD OF DETERMINATION

The flash point is the lowest temperature at which a substance gives off sufficient vapours to form a flammable mixture with the air on contact with a flame or spark. A product's flash point is determined by either of the two following methods: in a **closed cup**, meaning inside the container that contains it, or in an **open cup**, meaning near the surface of the liquid. The lower a liquid's flash point, the greater the risk of fire.

Example

Normal butanol has a flash point in a closed cup of 29°C (*Set-a-flash* method). It is therefore extremely flammable on a hot summer day when its vapours come in contact with a flame or spark.

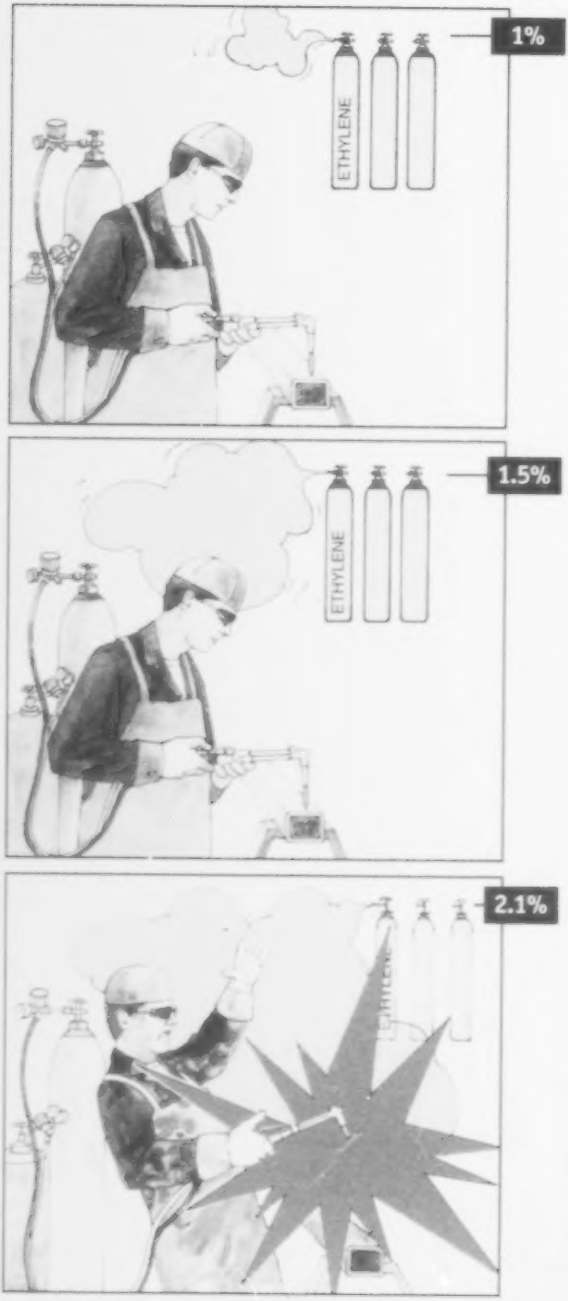

20°C
25°C
29°C

LOWER AND UPPER EXPLOSIVE OR FLAMMABLE LIMITS

These are the minimum and maximum concentrations of a product in the air between which a flammable or explosive mixture can form in the presence of an ignition source. These concentrations are expressed as a percentage of the volume in the air.

Example

Ethylene has a lower explosive limit of 2.1% and an upper limit of 36%. Therefore, in the presence of an ignition source, if the concentration of the gas is less than 2.1% or greater than 36%, there is no risk of explosion. But if the concentration of the substance is between these two limits, the mixture could explode. The concentration of the product in the air must be kept under its lower explosive limit, for example by using appropriate ventilation.

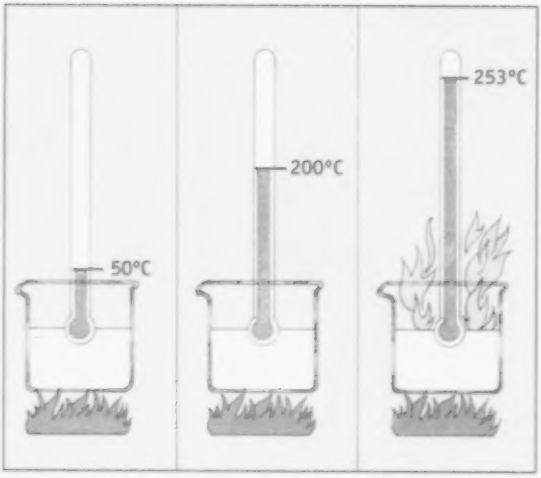

1%
ETHYLENE
1.5%
ETHYLENE
2.1%

AUTO-IGNITION TEMPERATURE

This is the lowest temperature at which spontaneous combustion of a product occurs. It begins to burn by itself in the absence of any flame or spark. The closer the auto-ignition temperature is to the ambient temperature, the greater the risk of fire.

Example

Turpentine has an auto-ignition temperature of 253°C. Therefore, it will not burst into flame by itself at ambient temperature.



CONDITIONS OF FLAMMABILITY

Conditions of flammability indicate whether a product could burst into flame and under what conditions.

Example

Toluene is a flammable liquid and will therefore burst into flame if it is near a source of ignition.

Note. – When a substance is classified "flammable", the necessary precautions must be taken to avoid it reaching its auto-ignition temperature or its flash point, depending on the case.

EXPLOSION CONDITIONS

Explosion conditions indicate whether a product is likely or not to explode when it is used.

Example

Toluene vapours form an explosive mixture with air.

EXPLOSION DATA — SENSITIVITY TO MECHANICAL IMPACT

These data indicate whether or not there is a risk of explosion on impact, and if so, specify under what conditions the explosion could occur.

Example

Picric acid may explode on impact.

EXPLOSION DATA — SENSITIVITY TO STATIC DISCHARGE

These data indicate whether or not there is a risk of explosion with a static discharge, and if so, under what conditions explosion could occur.

Example

When xylene is shaken or when it flows in pipes, it can accumulate a static charge that may cause the vapours to ignite.

MEANS OF EXTINCTION

This subsection contains a list of the extinguishing agents to use to fight a fire when this product is present or when it is the cause of the fire.

Example

Toluene: Carbon dioxide, dry chemical, water spray, alcohol foam.

SPECIAL PRECAUTIONS

This subsection describes the special precautions to take to fight a fire when this product is present or when it is the cause of the fire. Also indicated are the specific means for avoiding an explosion or the propagation of the fire.

Example

Toluene: Wear a self-contained breathing apparatus. The vapours are heavier than air and can travel a great distance towards a source of ignition and thus cause flashback.

HAZARDOUS COMBUSTION PRODUCTS

This subsection lists the combustion products that are health and safety hazards and that may form when the substance burns.

Example

Toluene: Carbon dioxide, carbon monoxide.

REACTIVITY DATA

CONDITIONS OF CHEMICAL INSTABILITY

This information indicates whether a substance is stable and, if need be, indicates the conditions that produce chemical instability.

Example

Sodium hypochlorite gives off toxic fumes of chlorine when it is heated. Appropriate ventilation must be provided to ensure that the permissible limit values are not exceeded.

NAME OR CLASS OF SUBSTANCES WITH WHICH THE PRODUCT IS INCOMPATIBLE

This subsection indicates whether a product must not be brought into contact with certain specified substances, and if need be, specifies the nature of the hazard if the product is brought into contact with these substances.

Example

12% bleach is incompatible with strong acids. On contact, it gives off toxic chlorine vapours.

CONDITIONS OF REACTIVITY

This indicates whether a substance is likely to react violently or dangerously under normal conditions of use. If need be, the nature of the hazard is specified.

Example

12% bleach is unstable in the presence of light and metals or when the pH of the solution becomes less basic.

HAZARDOUS DECOMPOSITION PRODUCTS

This subsection lists the products that are health and safety hazards that are likely to form when a substance decomposes. Decomposition may be the result of a reaction occurring at room temperature, exposure to light, or the effect of heat on the substance, etc.

Example

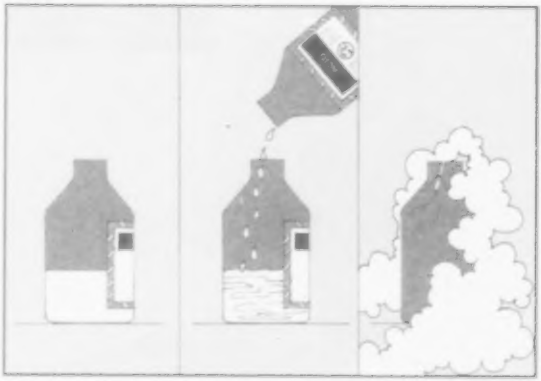
Ammonia: thermal decomposition (begins between 450°C and 500°C), giving off nitrogen and hydrogen.

POLYMERIZATION

This subsection indicates whether the substance can change into a polymer (the combining of several molecules) and under what conditions this change occurs. The heat given off and/or the expansion in volume caused by the polymerization reaction could cause the container to burst and the remaining product (unpolymerized) to spill. These accidents can be avoided by controlling the polymerization conditions.

Example

Exposure to light or contact with strong acids or bases can cause acrolein to polymerize.



TOXICOLOGICAL PROPERTIES

ROUTES OF ENTRY, SKIN AND EYE CONTACT

This section indicates the routes by which the substance can enter the body and produce harmful effects. These routes include the respiratory tract (inhalation), skin (cutaneous absorption) and the digestive tract (ingestion). Also included is any surface of the body on which the substance can produce a harmful effect by direct contact.

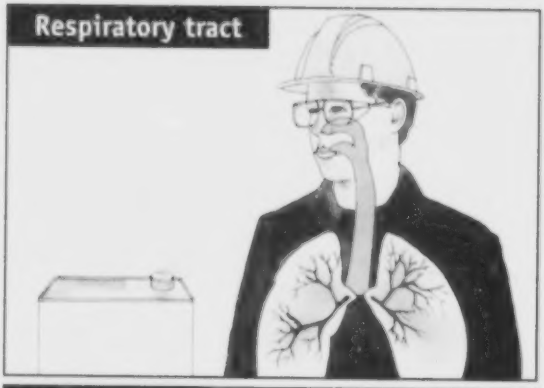
Examples

Routes of entry

Toluene: The substance is absorbed through the respiratory tract, skin and digestive tract.

Skin and eye contact

Sulfuric acid: Following direct contact with the skin and eyes, this product may cause burns.


Respiratory tract

Digestive tract

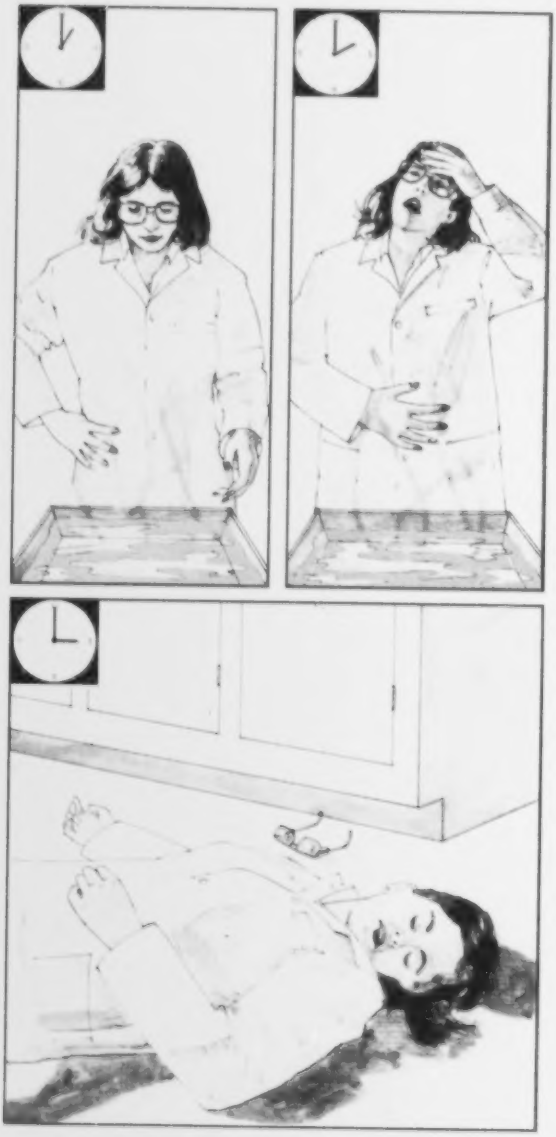
Skin

EFFECTS OF ACUTE EXPOSURE TO PRODUCT

These health hazards result from short-term exposure to the controlled product. Acute exposure is generally defined as a single or repeated exposure over a 24-hour period. Often, acute poisoning produces brief and reversible toxic effects. However, some effects may show up only several hours after intoxication. Also, some serious poisonings may produce sequellae.

Example

Exposure to high concentrations of acetone vapours (above 12,000 ppm) may cause dryness of the mouth and throat, salivation, anorexia, headache, nausea, vomiting, dizziness, incoordination, asthenia, lethargy and ataxia. In extreme cases, it can lead to stupor or coma.



EFFECTS OF CHRONIC EXPOSURE TO PRODUCT

These health hazards result from prolonged exposure to the controlled product at concentrations lower than those that produce acute effects. The duration of the exposure can vary (weeks, months, years).

Example

The repeated inhalation of styrene vapour may cause nervous system disorders that first appear as headache, nausea, dizziness, a loss of appetite, and general weakness. The following effects may subsequently be observed: increased reaction time, difficulty with colour perception, etc. Repeated skin contact with the product may cause redness, desquamation and cracking of the skin.

1st WEEK

2nd WEEK

3st WEEK

4th WEEK

EXPOSURE LIMITS

Exposure limits are the concentrations permitted in the air for a given substance. They represent the concentrations of the substance in the air to which the great majority of workers can be exposed daily, without suffering harmful effects. There are three types of values:

- Short-term exposure values, which are measured for a maximum duration of 15 minutes;
- Time-weighted average exposure values, which are measured for the duration of an 8-hour work shift;
- Ceiling values, which must never be exceeded for any period of time whatsoever.

On the material safety data sheet, the permissible limit values in Québec, which are specified by the *Regulation respecting occupational health and safety* (S-2.1, R.19), are sometimes presented. For more details, consult the *Regulations (ROHS)* section of this guide. However, the limit values recommended by the ACGIH® (*American Conference of Governmental Industrial Hygienists*), an American organization, are often the ones that appear on the MSDS. Exposure limit values are given in ppm, in mg/m^3 or in $fibres/cm^3$.

If a product consists of several ingredients, the exposure limit for each of the ingredients must be indicated on the MSDS.

IRRITANCY AND CORROSIVENESS

This subsection indicates whether the substance may cause irritation of the eyes, skin or mucous membranes of the respiratory and digestive tracts. A substance's irritating effects on the eyes or skin may be, for example, a minor tingling sensation to erythema (redness) or edema (swelling). This damage is **reversible**, meaning that it disappears with time, when exposure to the product stops. If the damage caused by a substance is **irreversible**, the substance is said to be corrosive.

Examples

Isopropyl alcohol is moderately irritating to the eyes and slightly or not irritating to the skin. Exposure to vapours of this substance may cause irritation of the eyes and upper respiratory tract.

Sodium hydroxide is a corrosive product that may cause serious burns accompanied by deep ulceration of the skin. On the eyes, it causes disintegration and escharification of the conjunctiva and cornea accompanied by edema and ulceration. Permanent opacification of the cornea is also possible. Exposure to dusts or mists may cause irritation and ulceration of the nasal passages. Pulmonary edema may occur with exposures to high concentrations of dusts or mists.

SENSITIZATION TO PRODUCT

Sensitization is an immune reaction of the body. It occurs following exposure to a chemical or biological substance and produces an allergic response of the respiratory tract (rhinitis, asthma) or skin (eczema). Exposure to the sensitizing substance may have previously produced no symptoms, until an initial allergic response occurs.

Examples

After an initial contact with isocyanates (TDI, HDI, MDI, etc.), subsequent contact may produce sensitization of the respiratory tract (asthma) in some people.

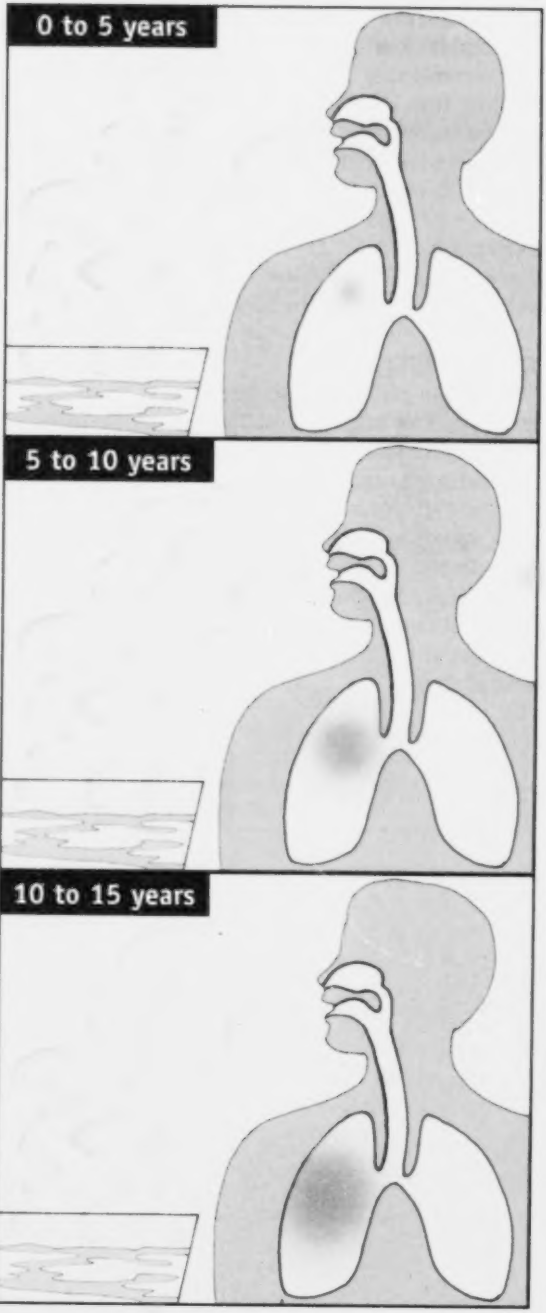
Formaldehyde (used as a preservative in various types of products such as cutting oils) is a skin sensitizer.

CARCINOGENICITY

This subsection specifies whether the substance can cause cancer or not. WHMIS uses the IARC (*International Agency for Research on Cancer*) and ACGIH® (*American Conference of Governmental Industrial Hygienists*) classifications to determine a substance's carcinogenic potential. A substance classified A1 and A2 by the ACGIH, or group 1, 2A and 2B by IARC, is recognized as carcinogenic by WHMIS. Substances can be listed as proven, probable or possible carcinogens, depending on the evidence observed.

Example

The *International Agency for Research on Cancer* (IARC) considers styrene as a possible human carcinogen (group 2B).


0 to 5 years
5 to 10 years
10 to 15 years

REPRODUCTIVE TOXICITY

Some substances can have toxic effects on reproduction, meaning that they can cause a change in fertility, thus affecting a woman's or a man's reproductive capability. For example, some substances may affect hormonal activity, spermatogenesis, etc., which may affect fertility.

Example

Carbon disulfide may cause sperm disorders as well as menstrual disorders in humans.

TERATOGENICITY

This section states whether the substance can cause malformations in newborns. The *Controlled Products Regulations* require that all effects on development be mentioned, and therefore embryotoxic and fetotoxic effects (effects other than malformations) must appear on the MSDS. These may include, for example, a reduction in body weight, growth retardation, dysfunction, death, etc. Effects on postnatal development (after birth) are also indicated. Most of the time, the information comes from animal studies.

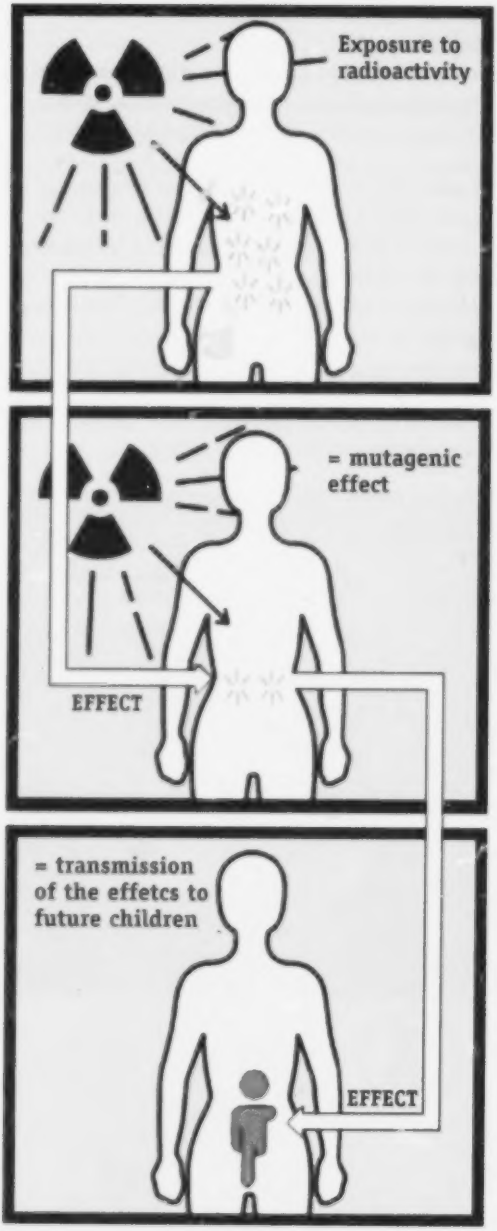
Example
Toluene has an embryotoxic and/or fetotoxic effect on animals.

MUTAGENICITY

This subsection indicates whether the substance may cause mutations (changes) in the genetic material (DNA) of cells. Mutations in the DNA of reproductive or germ cells (eggs or sperm) may cause hereditary effects, meaning that they are transmissible to offspring. Effects on other cells (nonreproductive or somatic cells) do not cause hereditary effects, but may lead to cell death, the transmission of the mutation to cells of the same tissue, or cancer.

Example

Benzene is a human mutagen.


Exposure to radioactivity
= mutagenic effect
EFFECT
= transmission of the effetcs to future children
EFFECT

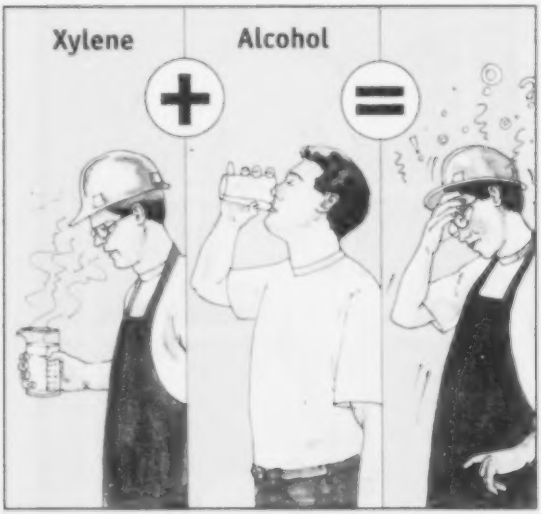
NAMES OF TOXICOLOGICALLY SYNERGISTIC PRODUCTS

These are substances or products that interact with the controlled product to produce a toxic effect greater than the sum of their individual effects.

There are other types of interactions between chemical products, namely antagonism (reduced toxic effects), the additive effect (effects that are added), etc. However, the *Controlled Products Regulations* do not require that these effects be mentioned on the MSDS.

Example

The duration of xylene's toxic effects increases with the consumption of alcohol or aspirin.



PREVENTIVE MEASURES

This section contains useful information for protecting the health and physical well-being of a worker exposed to the product under normal or accidental conditions of use, handling, or storage of this product.

PROTECTIVE EQUIPMENT TO BE USED

This subsection specifies the parts of the body to be protected and the type of protective equipment appropriate to the contaminant exposure and the regulations in force in Québec. For more information on the respiratory protective equipment to use in Québec, consult the following Web site: www.prot.resp.csst.qc.ca.

Example

Xylene

Respiratory tract

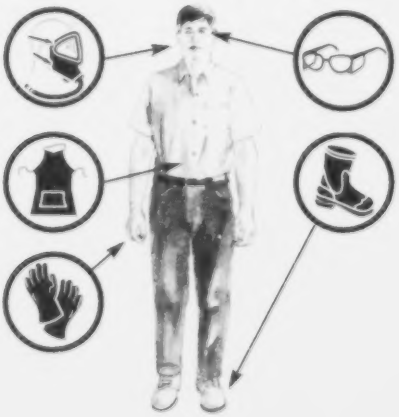
From 100 ppm, wear an appropriate respirator.

Skin

Gloves: Multilayer polyethylene/ethylene vinyl alcohol/polyethylene (PE/EVAL/PE), polyvinyl alcohol (PVAL), multilayer Viton®/butyl rubber/Viton® or Viton®.

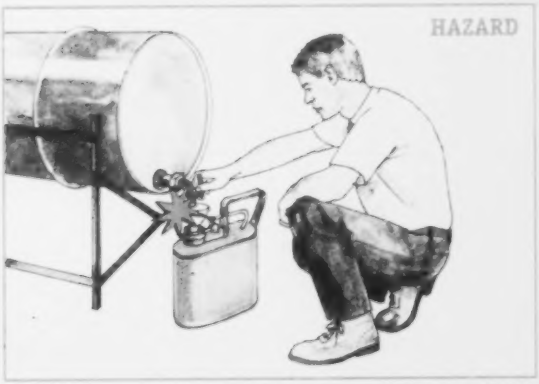
Eyes

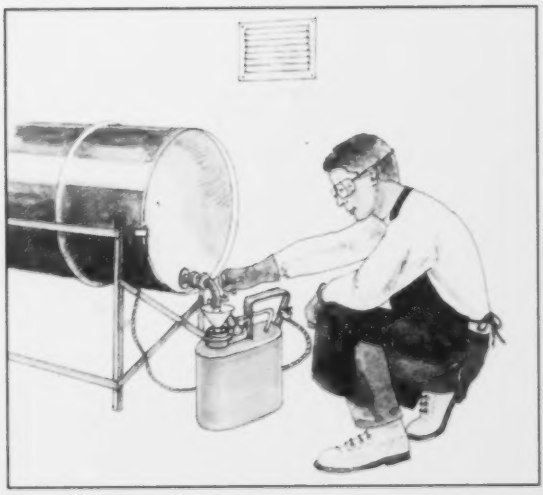
Wear safety glasses if there is a risk of splashing.



ENGINEERING CONTROLS TO BE USED
This subsection contains the specific procedures to apply to handle the product safely.

Example
Xylene
This flammable liquid must be handled in compliance with the *Flammable and Combustible Liquids Code* NFPA 30. Use tools that will not produce sparks. Wear the appropriate protective clothing. Equipment must be grounded: refer to NFPA 77 code.





PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL

This subsection contains procedures to apply in the event of accidental leaks or spills of the product as well as the means of disposing of it.

Example

Toluene

In the event of accidental leaks or minor spills, absorb with sand or any other non-combustible absorbent material. Place the mixture in a well-identified airtight container so that it can be treated later in compliance with the regulations in force.

WASTE DISPOSAL

The steps to be taken for product waste disposal are explained in this subsection.

Example

Xylene

Ventilate the site of the spill well so that the remainder of the liquid evaporates and the vapours disperse. Do not pour the waste into the sewer and do not dispose of contaminated absorbents in the garbage. If necessary, consult the regional office of the ministère de l'Environnement. Dispose of it in compliance with the municipal, provincial and federal regulations in effect.

HANDLING PROCEDURES AND EQUIPMENT

Consult the *Handling* subsection to learn how to handle the product safely.

Example

Acetylene

Compressed gas cylinders must not be subjected to violent impact, and a damaged cylinder must never be used. Do not use cylinders of compressed gas for purposes other than those for which they are intended. They must be attached upright or secured in a cart when they are used. Handle them away from all sources of heat and ignition. Use tools that will not produce sparks. Equipment must be grounded.

HAZARD

STORAGE REQUIREMENTS

The *Storage* subsection contains the conditions for safe storage of the product.

Example

Xylene

Store it in a cool and well-ventilated location, away from sources of heat and ignition and incompatible substances. The containers must be grounded.

SPECIAL SHIPPING INFORMATION

The *Shipping* subsection contains the special information relating to the shipping of dangerous goods. For more details, consult the *Regulations* section (*TDG*) of this guide.

HAZARD

FIRST AID MEASURES

This section of the MSDS describes the first aid to be given in the event of poisoning or accidental contact with the product.

Example

Styrene

Inhalation

In the event of inhalation of vapours, take the person to a ventilated location. If the person is not breathing, perform artificial respiration. Call a physician.

Eye contact

Rinse the eyes with plenty of water for 15 to 20 minutes. If the irritation persists, consult a physician.

Skin contact

Rapidly remove contaminated clothing. Wash skin with soap and water.

Ingestion

In the event of ingestion, rinse the mouth with water. If there are unusual symptoms, consult a physician.

REGULATIONS

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

In Québec, the CSST is responsible for applying WHMIS according to the *Regulation respecting information on controlled products* (Québec regulation), the *Controlled Products Regulations* (federal regulation) and the *Hazardous Products Act*.

WHMIS divides hazardous materials into six main classes. These classes are based on the hazard criteria listed in the *Controlled Products Regulations*. A controlled product is a substance that meets one or more classification criteria. This classification can be based on the data inherent in the material or data on its ingredients.

CLASSES

A: Compressed gas

B1: Flammable gases
B2: Flammable liquids
B3: Combustible liquids
B4: Flammable solids
B5: Flammable aerosols
B6: Reactive flammable materials

C: Oxidizing material

D1A: Very toxic material causing immediate and serious effects
D1B: Toxic material causing immediate and serious effects

D2A: Very toxic material causing other effects
D2B: Toxic material causing other effects

D3: Biohazardous infectious material

E: Corrosive material

F: Dangerously reactive material

DISCLOSURE LIST

This list specifies whether a substance is or is not on the disclosure list of regulated ingredients according to the *Hazardous Products Act* and the cut-off concentration at or above which it must be disclosed (namely 0.1% or 1.0%).

Example

Ammonia must be disclosed if its concentration in a mixture is equal to or greater than 1.0% (W/W).

***REGULATION RESPECTING OCCUPATIONAL HEALTH AND SAFETY* (ROHS)**

In Québec, the permissible exposure values for air contaminants are those prescribed by the *Regulation respecting occupational health and safety* (S2.1, R.19), extracts of which are presented below.

The **time-weighted average exposure value (TWAEV)** "is the time-weighted average concentration for an 8-hour workday and a 40-hour workweek of a chemical substance (in the form of gases, dusts, fumes, vapours or mists) present in the air in a worker's respiratory zone."

"For any work period equal to or longer than 4 hours but less than 8 hours or a period in excess of 8 hours but less than or equal to 16 hours, an **adjusted average exposure value (AAEV)** must be established in accordance with the *Guide to the adjustment of permissible exposure values for unusual work schedules*, published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (www.irsst.qc.ca), as it reads at the time it is applied. Under no circumstance may the AAEV be higher than the TWAEV."

The **short-term exposure value (STEV)** "is the 15-minute time-weighted average concentration for exposure to a chemical substance (in the form of gases, dusts, fumes, vapours or mists), present in the air in a worker's respiratory zone which should not be exceeded at any time during a workday, even if the time-weighted average exposure value is not exceeded. The average exposure for a 15-minute consecutive period may be included between the TWAEV and the STEV, insofar as such exposures are not repeated more than 4 times a day and have intervals between them of periods of at least 60 minutes."

The **ceiling value** "is the concentration never to be exceeded during any length of time whatsoever."

The regulation also includes **designations and remarks**: Pc (percutaneous), EM (exposure reduced to a minimum), RP (recirculation prohibited), S (sensitization) and the carcinogen designations.

For more details, consult Schedule 1 of the *Regulation respecting occupational health and safety*.

TRANSPORTATION OF DANGEROUS GOODS (TDG)

In Québec, the TDG is regulated by the *Transportation of Dangerous Substances Regulation* of the ministère des Transports of Québec. It was adopted in compliance with the *Transportation of Dangerous Goods Regulations* of Transport Canada, in application of the *Transportation of Dangerous Goods Act*.

DEFINITIONS

PIN (UN): **P**roduct **I**dentification **N**umber. Numeric or alphanumeric designation used to identify a substance or a group of substances with the same name as dangerous goods in the regulation.

Class: numeric data used to designate a substance according to the characteristics of the hazard. In the *Transportation of Dangerous Goods Act*, products are divided into nine classes. A substance can be assigned more than one class, with the primary class (describing the main hazard) and the subsidiary class or classes also indicated.

Packing group/risk group: designation in roman numerals used to indicate the packing group or the risk group to which a dangerous good belongs.

Special provisions: numeric designation used to define the specific measures related to handling, the offering for transport or the transportation of dangerous goods.

Explosive limit and limited quantity index: number indicating the maximum amount of the hazardous good that may be handled or transported, or whose transport can be requested.

ERAP index: number indicating the maximum amounts related to ERAP (Emergency Response Assistance Plans), beyond which the dangerous goods are subject to the provisions of ERAP.

Passenger-carrying ship index: number indicating "the maximum quantity of dangerous goods per consignment that can be carried in a passenger carrying ship".

Passenger-carrying road vehicle or passenger-carrying railway vehicle index: number indicating "the maximum quantity of dangerous goods that can be transported per consignment on a passenger-carrying road vehicle or a passenger carrying railway vehicle".

Marine pollutant: indicates whether the dangerous goods are marine pollutants.

GLOSSARY

A

AAEV
Adjusted average exposure value according to the *Guide to the adjustment of permissible exposure values for unusual work schedules*, published by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail.

Absorption
Passing of a substance from outside to inside the body. Absorption pathways are routes by which a substance enters the body without injury. The usual routes in the workplace are the respiratory tract (by inhalation) and skin (cutaneous penetration). The digestive tract (ingestion) is the least common.

ACGIH®
American Conference of Governmental Industrial Hygienists. Non-governmental American organization of industrial hygienists from governmental agencies. The ACGIH® develops and publishes recommended exposure standards for chemicals and physical agents as well as a list of biological exposure indices.

Acid
A chemical substance that can release a hydrogen ion (H^+). Acidity is measured in pH units from 0 to 7, where 7 is neutral and 0 very acid. According to WHMIS, a substance is a corrosive material if its pH is equal to or less than 2, when precise data are lacking.

Active (or reactive) metals
Metals that react easily and rapidly with water, acids or alkalis (examples: sodium, aluminum and zinc).

Alkalis
Carbonates, hydroxides, silicates, etc., of alkali metals (examples: sodium hydroxide, potassium hydroxide, etc.). Alkalis are basic and often corrosive substances.

Alopecia
Total or partial loss of hair, usually temporary.

Anemia
Reduction in the number of red blood cells or the amount of hemoglobin per unit volume of blood.

Anhydrous
Environment that does not contain any water, as opposed to humid, or a substance that does not contain water, as opposed to hydrated.

Anorexia
Reduction or loss of appetite.

Anoxia
Reduction in the amount of oxygen carried by the blood into the tissues.

Anuria
Absence of urine in the bladder.

Apathy
Absence of feeling with indifference to outside stimuli.

Apnea
Transient cessation of breathing.

Argyria
Poisoning by silver and its salts.

Arrhythmia
Disturbance in the heart rate.

Asphyxia
Difficult breathing or respiratory arrest.

Asthenia
Reduction or loss of strength (physical and psychic).

Asthma
Respiratory illness caused by an inflammatory reaction of the bronchi with symptoms such as difficult breathing, cough and wheezing.

Ataxia
Incoordination of movements.

Atrophy
Reduction in the weight and volume of an organ, tissue or cells.

B

Base
A chemical substance that can release a hydroxide ion (OH^-). Basicity is measured in pH units from 7 to 14, where 7 is neutral and 14 very basic. According to WHMIS, a substance is a corrosive material if its pH is equal to or greater than 11.5, when precise data are lacking.

Biological exposure indices (BEI®)
Numerical value used to evaluate the amount of a substance absorbed by the body. The substance or one of its metabolites is measured in a tissue, a biological liquid or in the expired air. This designation is published by the ACGIH®. The French equivalent is IBE (*Indices biologiques d'exposition*).

Biological monitoring
Periodic monitoring of one or more biological media (blood, urine, etc.) in order to determine the absorption of a contaminant following exposure.

Blindness
Loss of sight.

Blood lead concentration
Amount of lead in the blood.

Bond, To
To connect all conductive components in an electrical installation together.

Bradycardia
Slowing of the heart rate.

Bronchitis
Inflammation of the bronchi.

Bronchoconstriction
Contraction with narrowing of the bronchi.

Bronchospasm
Spasmodic contraction of the muscles surrounding the bronchi.

Byssinosis
Pulmonary disorder due to the chronic inhalation of cotton dust.

C Carcinogenic (Effect)
Indicates that the product may cause cancer.

CAS number
Number assigned by the *Chemical Abstracts Service*, a division of the *American Chemical Society*, to identify a chemical substance. It is recognized by the characteristic presence of two dashes always located at the same place. Example: 12345-67-8.

Central nervous system (CNS)
System consisting of the brain and spinal column. The effects of contaminants on the CNS can be the following: headache, nausea, vomiting, dizziness, incoordination, drowsiness, anesthesia, convulsions, etc.

Cephalgia
Headache.

Characteristics of an exposure
Defines or characterizes the exposure to a substance by establishing relationships between the product's physical properties or between them and the data used in industrial hygiene.

Chlorhydrate
Chemical substance with at least one amine group, which combines with hydrogen chloride in a well-defined proportion (for example, hydroxylamine chlorhydrate).

Cholinesterase
Enzyme present in the blood (causes the hydrolysis of choline esters).

CIRC
Centre international de recherche sur le cancer.
CIRC evaluates and publishes information on the carcinogenicty of various products. The English equivalent is IARC (*International Agency for Research on Cancer*).

Cirrhosis
Chronic progressive disease affecting the liver's structure and function.

Collapse
Rapid reduction in strength or the collapse of an organ, which may result in shock.

Combustion products
Contaminants originating from the complete combustion of the product in air. Their nature and quantity depend greatly on the temperature and amount of air (oxygen). For example, fire could produce substances very different from those that are given off when the substance is handled at high temperatures (thermal decomposition products).

Congestion
Abnormal accumulation of blood in the vessels of a tissue, organ or part of the body.

Conjunctivitis
Inflammation of the conjunctiva (mucous membrane covering the eye).

Convulsions
Violent involuntary muscle contractions.

Corrosion
Destruction of biological tissue (skin, cornea, etc.) or materials. When precise data are lacking, according to WHMIS, a substance is a corrosive material if its pH is equal to or less than 2 or equal to or greater than 11.5.

Cutaneous
Related to the skin.

Cyanosis
Bluish coloration of the skin and mucous membranes produced by a lack of oxygen.

D

Degeneration
Abnormal change in an organ, a tissue or faculty, leading to a change in its functioning, but not always permanent.

Deliquescent
Substance that absorbs moisture from the air to the point of becoming liquid.

Dental erosion
Surface erosion of the teeth.

Dermatitis
Inflammation of the skin.

Dermatosis
Generic name for all skin disorders.

Desquamation
Abnormal shedding of the surface layers of the skin in small flakes.

Development (Effects on)
Indicates that the substance may have effects during prenatal development (before birth) and/or postnatal development (after birth until puberty). These effects include malformations (teratogenic effect), effects that may affect the embryo or the fetus (retarded growth, reduction in body weight, death, etc.) as well as postnatal effects (behavioural disorders, etc.).

DNA
Deoxyribonucleic acid (DNA) is a macromolecule (giant molecule) in the form of two complementary strands wrapped around each other in a double helix. DNA is the main component of chromosomes, and therefore the carrier of genetic material.

Diuretic
Increases the urinary output.

DIVS
Danger immédiat pour la vie ou la santé. This is the maximum concentration of a product present in an environment from which an individual can escape in a 30-minute period, without having symptoms that prevent him from escaping and without suffering irreversible health effects. This concentration has been defined in order to be able to choose an appropriate respiratory protective device. (This designation is published by NIOSH, *National Institute for Occupational Safety and Health;* the English acronym is IDLH: Immediately Dangerous to Life or Health.

Dysarthria
Difficulty articulating words.

Dysphagia
Difficulty swallowing.

Dysphonia
Change in voice.

Dyspnea
Difficulty breathing.

Dysuria
Difficulty urinating.

E

Edema
Diffuse swelling caused by infiltration of liquid into the tissues.

Embryo
Product of conception from the fertilized egg to the end of the third month of pregnancy. The embryo stage precedes the fetal stage.

Embryotoxic
Toxic effect on the embryo.

Encephalopathy
Disease affecting the brain in general.

Epigastric
The region located between the ribs and the sternum above, the sides of the abdomen, and the umbilical region below.

Epithelium
Tissue that covers the external surfaces (skin, mucous membrane of natural orifices) and inside surfaces of the body (digestive tract, glands).

Erythema
Redness of the skin due to dilation of the capillaries.

Eschar, escharification
Necrosis of a skin tissue or mucous membrane, forming a blackish crust.

Euphoria
Intense feeling of well-being.

Expectoration
Expulsion by the mouth of secretions from the respiratory tract (sputum).

F **Fasciculation**
Isolated, involuntary and uncontrollable contraction of a group of muscle fibres (never resulting in movement).

Flatulence
Accumulation of gas in the digestive tract.

Fluorosis
Characteristic chronic poisoning caused by fluorine and its derivatives.

Fetotoxic
Toxic effect on the fetus.

Fetus
Product of conception from the end of the third month of pregnancy to the end of intrauterine life. The fetal stage follows the embryonic stage.

G **Gastroenteritis**
Simultaneous inflammation of the mucous membrane of the stomach and small intestine.

Gene
Heredity-carrying material located on the chromosomes inside the nucleus.

Granuloma
Small benign nodular inflammatory tumour.

Ground, To
To connect all conductive components in an electrical installation to the ground.

H **Hematemesis**
The vomiting of blood.

Hematoma
Localized accumulation of blood in a tissue.

Hematopoietic system
System responsible for the formation of blood cells (includes the bone marrow and the lymphatic organs).

Hematuria
Presence of blood in the urine.

Hemoglobinuria
Presence of hemoglobin in the urine.

Hemolysis
Destruction of red blood cells, releasing hemoglobin.

Hemorrhage
Loss of blood.

Hepatomegaly
Enlargement of the liver.

Hepatotoxic
Toxic to the liver.

Hydrate
Chemical substance combined with water in a well-defined proportion. The adjective can be preceded by the prefixes mono-, di-, tri-, etc. (example: calcium sulfate dihydrate).

Hydrolysis
Chemical reaction (fragmentation) of a substance into several other smaller substances by the chemical addition of water. Occurs in an aqueous environment, which can induce the formation of new substances.

Hygroscopic
Substance that tends to absorb moisture from the air.

Hyperemia
See the definition of congestion.

Hyperpigmentation
Excessive skin pigmentation.

Hyperplasia
Increase in the number of normal cells.

Hyperreflexia
Exaggeration of reflexes.

Hypertension
High blood pressure.

Hypotension
Low blood pressure.

Hypothermia
Lowering of body temperature below normal (37°C).

I

IARC
International Agency for Research on Cancer. IARC evaluates and publishes information on the carcinogenicity of various products. The French equivalent is CIRC (*Centre international de recherche sur le cancer*).

Icterus (jaundice)
Yellow coloration of the skin and mucous membranes.

IDLH
Immediately Dangerous to Life or Health. This is the maximum concentration of a product present in an environment from which an individual can escape in a 30-minute period, without having symptoms that prevent him from escaping and without suffering irreversible health effects. This concentration has been defined in order to be able to choose an appropriate respiratory protective device. (This designation is published by NIOSH, *National Institute for Occupational Safety and Health*; the French acronym is DIVS: *danger immédiat pour la vie ou la santé*.)

Immunosuppression
Reduction in the immune response (body's defence mechanism).

IBE

Indices biologiques d'exposition. Numerical value used to evaluate the amount of a substance absorbed by the body. The substance or one of its metabolites is measured in a tissue, a biological liquid or in the expired air. This designation is published by the ACGIH®. The English equivalent is BEI® (Biological exposure indices).

Insoluble
A substance that cannot be dissolved in a solvent or a given liquid.

Irritability
Abnormal response to stimuli.

Irritation
Reversible changes in the skin, eyes or mucous membranes (examples: redness, inflammation).

K

Keratitis
Inflammation of the cornea (front part of the eye).

Keratoconjunctivitis
Inflammation of the cornea and conjunctiva of the eye.

L

Lacrimation
Involuntary flow of tears.

Laryngitis
Inflammation of the larynx.

Latency
State of what exists unseen but that can manifest itself at any time.

Lethargy
Deep and prolonged sleep or extreme indifference.

Leucopenia
Reduction in the number of white blood cells.

Lymphocytosis
Increase in the number of lymphocytes (type of white blood cells).

M

Manganism
Chronic poisoning caused by manganese and some of its derivatives.

Material
Term used in the federal law relating to WHMIS (*Hazardous Products Act*). This generic term also includes pure substances as well as mixtures.

Metabolic acidosis
Disturbance of the body's acid-base balance. It corresponds to an excess of acid in the blood. The acid-base balance is the constant balanced ratio of the acids and bases in the body.

Methemoglobin
Hemoglobin whose ferrous iron has been oxidized to ferric iron, which makes it unable to carry oxygen.

Methemoglobinemia
Presence of abnormal concentrations of methemoglobin in the blood, resulting in cyanosis.

Miction
To urinate.

Miscible
Substances that dissolve completely in each other and form only one phase.

Molecular formula
Representation of the chemical elements that make up a pure substance as well as their relative proportions.

Mucous membranes
Membranes that line body cavities and that are covered with a viscous substance (mucus).

Mutagenic (Effect)
Indicates that the substance can cause changes in the genes (carriers of hereditary information).

N

Narcosis
Induced sleep.

Necrosis
Cell death, tissue death.

Nephritis
Kidney inflammation.

Nephropathy
Any disease of the kidney.

Nephrotoxic
A substance toxic to the kidneys.

Neurasthenia
Psychiatric disorder included in the group of neuroses and characterized by asthenia.

Neuropathy
Any disorder of the nervous system.

Neuropathy (peripheral)
Disorder of the peripheral nerves.

Neurotoxic
A substance toxic to the nervous system.

Neuritis
Inflammation of a nerve.

NTP (Normal temperature and pressure)
Normal temperature and pressure, namely 20°C and 760 mm Hg (101.32 kPa).

Nystagmus
Involuntary oscillating or rotating movement of the eyeballs.

O

Oliguria
Reduction in the amount of urine secreted by the kidneys.

P

Palpitation
Awareness of one's own heartbeat, felt as a disturbing and sometimes painful phenomenon.

Paresthesia
Anomaly in the perception of sensations, or a spontaneous non-painful subjective sensation.

Patch test
A patch test consists of applying a small quantity of allergen to the skin, which is covered with a material (occlusion). The objective of this test is to reproduce eczema over a limited area. It is useful in identifying the allergens responsible for eczema.

Peritonitis
Inflammation of the peritoneum (membrane lining the abdominal cavity and covering certain organs).

Petechiae
Subcutaneous hemorrhage characterized by small red spots.

Pharyngitis
Inflammation of the pharynx (throat).

Photophobia
Unpleasant and painful feeling in the eyes, caused by light.

Photosensitive
Substance that changes in the presence of light.

Photosensitization
Abnormal reaction (sensitization) of the skin to light.

Pneumoconiosis
Chronic lung disease due to the inhalation of certain types of dusts.

Pneumonia
Acute lung infection characterized by inflammation.

Pneumonitis (chemical)
Lung inflammation caused by exposure to a chemical.

Pneumopathy
Any pulmonary disease.

Polyneuritis
Inflammation of several nerves.

Polyuria
Excretion of an abnormally large amount of urine during a given period.

ppm
Measurement of concentration by volume. Concentration is expressed in parts per million, for example in cm^3 of the substance per million cm^3 of air. By analogy, one part per million (1 ppm) represents the volume occupied by an orange in a carload of goods or a dollar coin in one million dollar coins.

Procarcinogen
Substance that must be changed by the body to become a carcinogen.

Product
This term applies to a pure chemical as well as a mixture.

Promoter (of carcinogenesis)
Substance capable of promoting the carcinogenic effect of another substance (subsequent exposure).

Prostration
Extreme exhaustion.

Psychosis
A group of mental illnesses characterized by a change in personality and a loss of contact with reality.

Pulmonary emphysema
Disease characterized by the dilation or destruction of the pulmonary alveoli.

Pulmonary fibrosis
Chronic lung disease producing progressive respiratory insufficiency.

Pulmonary granulomatosis
Pulmonary lesion characterized by the formation of small nodules (granuloma).

Pyrophoric
Substance that ignites spontaneously in air.

R

Rad
Radiation Absorbed Dose. Unit of an absorbed dose of ionizing radiation.

Radiomimetic
Having an action identical to that of ionizing radiation.

RADS
Reactive Airways Dysfunction Syndrome. Also called asthma without latency period. It is caused by exposure to high concentrations of irritating substances.

Respiratory zone
Zone inside a hemisphere of 300-mm radius extending in front of the face and with its centre on an imaginary line joining the ears.

Rhinitis
Inflammation of the mucous membrane of the nasal passages.

S

Saturnism
Poisoning by lead or its salts.

Sensitization
Reaction of the body resulting from exposure to a physical, chemical or biological agent leading to an allergic response of the respiratory tract (rhinitis, asthma) or of the skin (eczema). Exposure to the sensitizing agent may not have produced any prior consequence until the initial allergic response occurs.

Siderosis
Infiltration of tissues by inhaled iron dusts or by iron compounds. **Pulmonary siderosis** is a pneumoconiosis caused by the accumulation of iron dusts in the pulmonary alveoli.

Silicosis
Pneumoconiosis, lung disease caused by the inhalation of crystalline silica dust.

Stenosis
Narrowing of a natural duct or orifice.

STEV
Short-term exposure value.

STP (Standard temperature and pressure)
Standard temperature and pressure, namely 0°C and 760 mm Hg (101.32 kPa).

Strabismus
Failure of two visual axes to converge on a fixed point (causing cross-eyes).

Sublimation
To go directly from the solid to the gaseous state without going through the liquid state.

Substance
Term generally used in federal legislation (*Transportation of Dangerous Goods Act*) and provincial legislation (*Regulation respecting occupational health and safety*). This term applies to a homogeneous material of defined chemical composition that cannot be separated by a mechanical process. This definition therefore does not apply to solutions, dispersions, alloys, etc., which are mixtures of several substances. Examples: oxygen (O_2), hydrogen chloride (HCl).

Syncope
Complete temporary loss of consciousness following cardiac and respiratory arrest.

T

Tachycardia
Rapid heart rate.

Tachypnea
Abnormally rapid breathing.

Tetanic
Said of a persistent muscle contraction.

Thrombocytopenia
Reduction in the number of blood platelets.

Toxicokinetic
Study of the fate of a toxic substance in the body. The amount of substance that acts with the body to cause a harmful effect depends on four main biological factors, namely absorption, distribution, metabolism (or biotransformation) and excretion.

Tumorigenic
Tumour producing.

TWAEV
Time-weighted average exposure value.

U

Ulceration
Formation of ulcers.

UN number
Alphanumeric designation (two letters, UN, followed by four digits) used to identify a hazardous good or a group of hazardous goods with the same characteristics. It is also used to identify rapidly a substance when it is transported in North America.

V

Vasoconstriction
Contraction with narrowing of the blood vessels.

Vasodilation
Dilation of the blood vessels.

Ventricular fibrillation
Rapid and irregular contractions of the muscle fibres of the heart ventricles, characterized by an irregular pulse and that may lead to a stoppage in cardiac output.

MEASUREMENT UNITS

°C	degree Celsius
cm	centimetre
kg	kilogram
g	gram
kPa	kilopascal
l	litre
m	metre
m^3	cubic metre
mg	milligram
ml	millilitre
mm	millimetre
mm Hg	millimetre of mercury
mppcf	million particles per cubic foot of air
mSv	millisievert
Pa	Pascal
ppb	parts per billion
ppm	parts per million
Sv	sievert
µg	microgram
µm	micrometre or micron

CONVERSION FACTORS

To convert mg/m^3 into ppm
at 25°C and 760 mm Hg (101.32 kPa)*

$$\text{ppm} = \text{mg/m}^3 \times \frac{24.45}{\text{molecular weight}}$$

To convert ppm into mg/m^3
at 25°C and 760 mm Hg (101.32 kPa)*

$$\text{mg/m}^3 = \frac{\text{ppm} \times \text{molecular weight}}{24.45}$$

To convert mg/l into mg/m^3

$$1\ \text{mg/m}^3 = \text{mg/l} \times 1000$$

To convert mm Hg into kPa

$$\text{kPa} = \text{mm Hg} \times \frac{133.32}{1000}$$

To convert °F into °C

$$°C = \frac{(°F - 32) \times 5}{9}$$

To convert °C into °F

$$°F = \frac{(°C) \times 9 + 32}{5}$$

To convert log Pow into the coefficient of water/oil distribution

$$\text{Coefficient of water/oil distribution} = 10^{-(\log \text{Pow})}$$

To convert the coefficient of water/oil distribution into log Pow

$$\text{Log}_{10}\ \text{Pow} = -\log_{10}\ (\text{coefficient of water/oil distribution})$$

*Only applies to gases and vapours.

SERVICES OFFERED

What services are offered by the CSST's Service du répertoire toxicologique for chemical and biological contaminants?

- Information on chemical and biological substances taken from the product database. It contains information on physical and chemical characteristics, toxicological properties, preventive measures, first aid and regulations. The Service's web site contains a list of useful links, a glossary, as well as various documents.

- Information on WHMIS.

How can you access the services offered?

- Through the web site at the following address: www.reptox.csst.qc.ca.
- By telephone, from 8:30 a.m. to 4:30 p.m. from Monday to Friday inclusively, except statutory holidays, by asking for the professional on duty.
- By mail.
- By e-mail.
- By fax.
- By coming to the office during working hours.

ADDRESS

Service du répertoire toxicologique
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WHMIS - Material safety data she

1 PRODUCT INFORMATION

Product name: Solvant X
Usage: Multi-purpose solvent
Manufacturer: ABC Chemical Products inc.
1234, rue ABC
Montréal (Québec) Z0Z 0Z0
Emergency tel. no.: 1800 123-4567

2 PREPARATION INFORMATION

Data sheet prepared by: The Health and Safety De
Tel.: (514) 456-1289
Date of update: 2002-09-

3 HAZARDOUS INGREDIENTS

Hazardous ingredients	%	CAS
Methyl isobutyl ketone	15 - 40	108-10-1
Xylene (o,m,p isomers)	60 - 100	1330-20-7

4 PHYSICAL DATA

Physical state and appearance: Non-viscous liquid
Density: 0.855 g/ml
Colour and odour: Colourless. Aromatic odour
Odour threshold: 0.1 ppm
Freezing point: Unavailable
Boiling point: 119°C

5 FIRE OR EXPLOSION HAZARD

Flash point and method of determination: 22.8°C
Lower flammable limit: 1.1%
Upper flammable limit: 7.2%
Auto-ignition temperature: 463°C
Conditions of flammability: Flammable liquid. May
of oxidizing materials.
Explosion conditions: May explode if its vapours are
Explosion – sensitivity to impact: Not available.
Explosion – sensitivity to static discharges: May a
pipes, which may result in ignition of the vapours.
Means of extinction: Carbon dioxide (CO_2), dry chem
Special precautions: Wear a self-contained breathing
ignition source and flash back.
Hazardous combustion products: Carbon monoxide

6 REACTIVITY DATA

Conditions of chemical instability: Stable under no
sive peroxides.
Chemical incompatibility: Strong oxidizing and redu
Conditions of reactivity: When it is heated.
Hazardous decomposition products: Carbon monoxi

et

Supplier: XYZ Distributions enr.
123, rue XYZ
Québec (Québec) X0X 0X0
Emergency tel. no.: 1 800 987-6543

rtment

LD_{50}, Species, Routes	**CL_{50}, Duration, Species**
1,900 mg/kg, mouse, oral	4,000 ppm, 4 hours, rat
4,300 mg/kg, rat, oral	5,000 ppm, 4 hours, rat

Vapour pressure: 9.2 mm Hg
Vapour density: 3.59
Evaporation rate (ether=1): 8.3
Cœfficient of water/oil distribution: 0.015
pH: N/A
Solubility in water at saturation: 6.7 g/l

losed cup, Tag method)

rst into flame when it is near an ignition source or in the presence

ixed with air.

mulate an electrostatic charge when it is shaken or when it flows in

al powder, water spray, alcohol foam.
pparatus. The vapours are heavier than air and may travel to an

d carbon dioxide.

al conditions of use. When it is heated, possibility of formation of explo-

ng agents.

and dioxide, low molecular weight aldehydes and carboxylic acids.

7) TOXICOLOGICAL PROPERTIES

Routes of entry: Respiratory tract, skin and digestive tract.
Effects of acute exposure: Headache, nausea, dizziness, vomiting. ment and death.
Effects of chronic exposure: Headache, fatigue, anxiety, depressio disorders.
Irritancy of product: Slight eye irritation and moderate skin irritat tract irritation. Repeated or prolonged contact: degreasing action o
Sensitization to product: No
Carcinogenicity: Non carcinogenic. IARC group 3.
Reproductive toxicity: No
Teratogenicity: Embryotoxic and/or fetotoxic effects on animals.
Mutagenicity: No
Toxicologically synergistic products: The duration of xylene's toxi or with simultaneous exposure to toluene or ethylbenzene.

Exposure limits	TWAEV (ROHS)
Xylene	100 ppm (434 mg/m^3)
Methyl isobutyl ketone	50 ppm (205 mg/m^3)

8) PREVENTIVE MEASURES

Protective equipment:
Respiratory: Chemical cartridge respirator with organic vapour cartr *respiratoire utilisés au Québec.*
Eyes: Safety glasses
Gloves: Multilayer: polyethylene/ethylene vinyl alcohol/polyethyler
Engineering controls: Use non-sparking tools and non-sparking ve
Leaks or spills: Use a noncombustible absorbent. Place the waste i authorities.
Waste disposal: Do not dispose of contaminated absorbents in the ing liquid and disperse vapours. Consult the regional office of the
Handling: Use away from incompatible materials and from any sou tion, use an appropriate respiratory protective device. Avoid all ski NFPA 30 and NFPA 77 codes.
Storage: Store away from any source of heat and ignition, in an ai away from oxidizing materials. The containers must be grounded. R
Shipping: TDG UN1993, class 3, packing group II.

9) FIRST AID MEASURES

Inhalation: Remove the person to fresh air. If the person is not br
Eye contact: Rinse the eyes with plenty of water for 15 to 20 minu
Skin contact: Rapidly remove contaminated clothing. Wash the ski physician.
Ingestion: If swallowed, rinse the mouth. Have the person drink a physician.

higher concentrations: narcosis, confusion, cardiac impair-

sensation of inebriation, and balance, sleep and memory

n. Exposure to vapours: eye irritation and upper respiratory
kin, redness, desquamation and cracking.

effects increases with the consumption of alcohol or aspirin

STEV (ROHS)
150 ppm (651 mg/m^3)
75 ppm (307 mg/m^3)

ges, in accordance with the *Guide des appareils de protection*

(PE/EVAL/PE); polyvinyl alcohol (PVAL).
ilation system.
a sealable container. Avoid spilling into sewers. Warn the

rbage. Ventilate the spill site well to evaporate the remain-
nistère de l'Environnement.
e of heat and ignition. In the event of insufficient ventila-
contact. Wear appropriate protective clothing. Refer to

ght container placed in a cool, dry and well-ventilated area.
er to NFPA 30 and NFPA 77 codes.

hing, perform artificial respiration. Call a physician.
s. If irritation persists, consult a physician.
with soap and water. If irritation persists, consult a

ass of water. Do not induce vomiting, and consult a

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Visit the CSST's Web site:
www.csst.qc.ca

The purpose of this guide is to facilitate the use and understanding of the information in a substance's material safety data sheet, in accordance with the Workplace Hazardous Materials Information System (WHMIS). The guide provides explanations on the content of the Hazardous ingredients, Physical data, Fire or explosion hazard, Reactivity data, Toxicological properties, Preventive measures and First aid measures sections.

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et à l'expertise-conseil
Direction de la prévention-inspection
Service du répertoire toxicologique

DC 200-338-4A (04-05)

Québec